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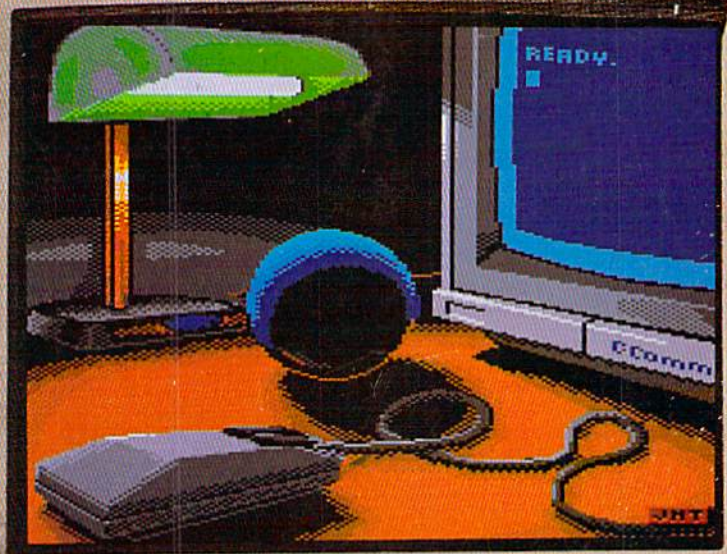
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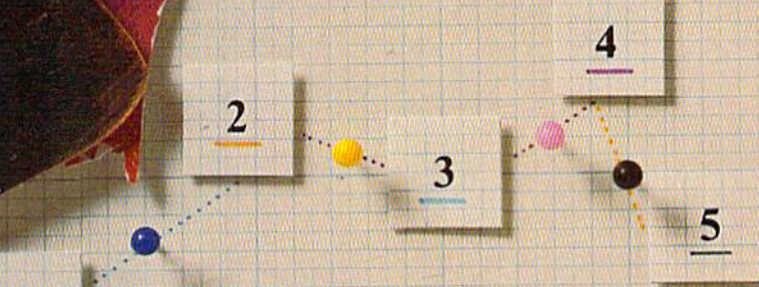
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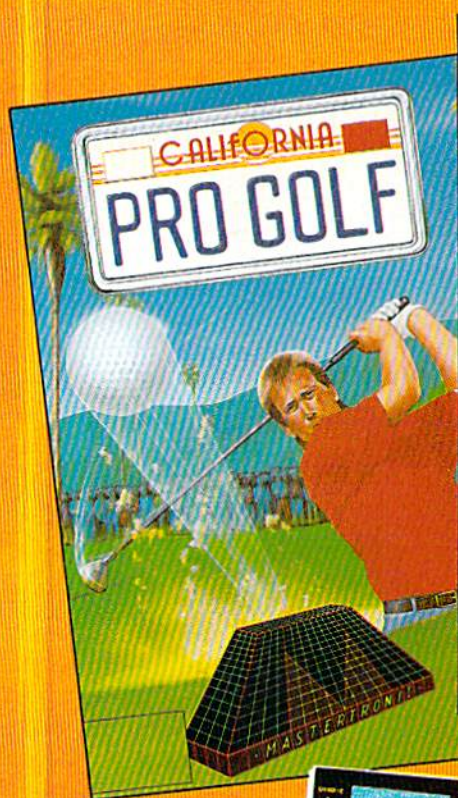
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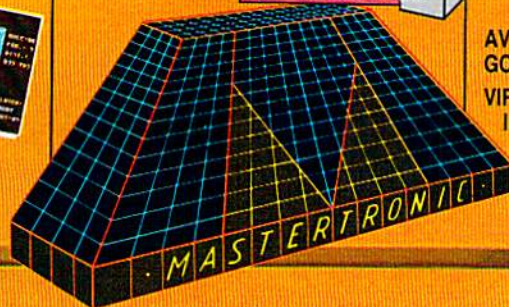
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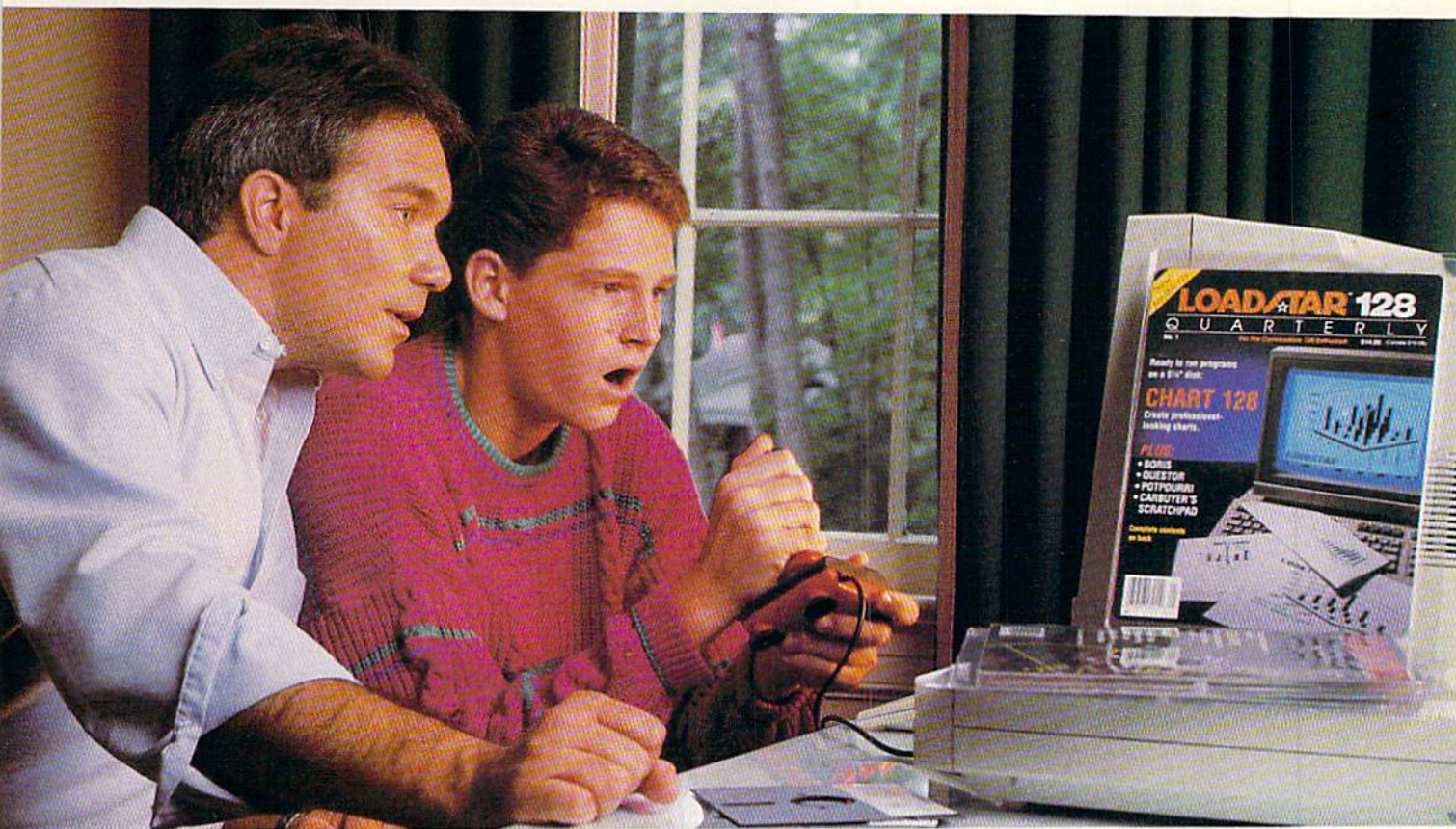


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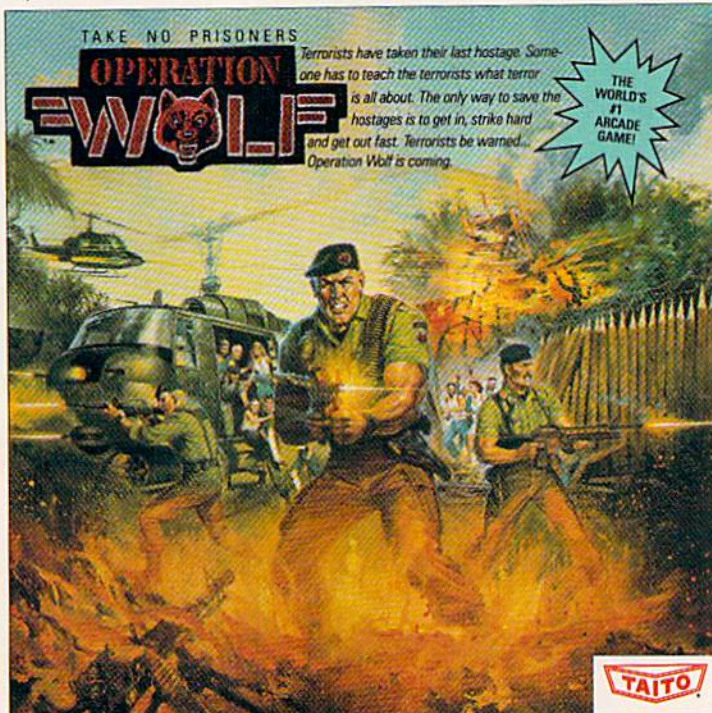
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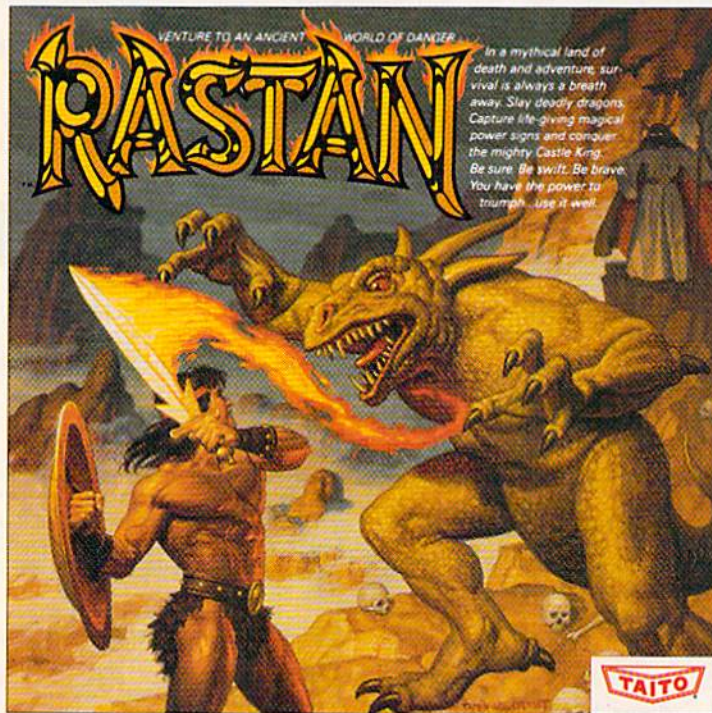
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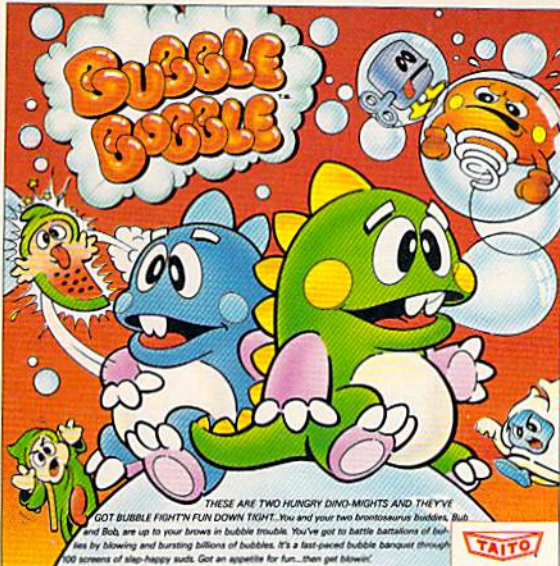
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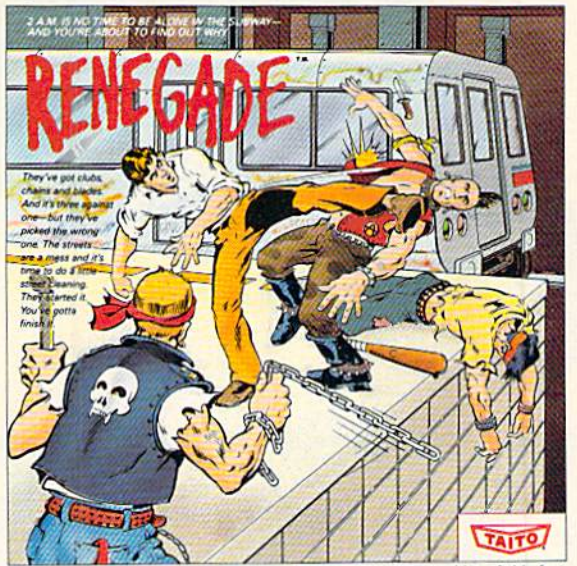
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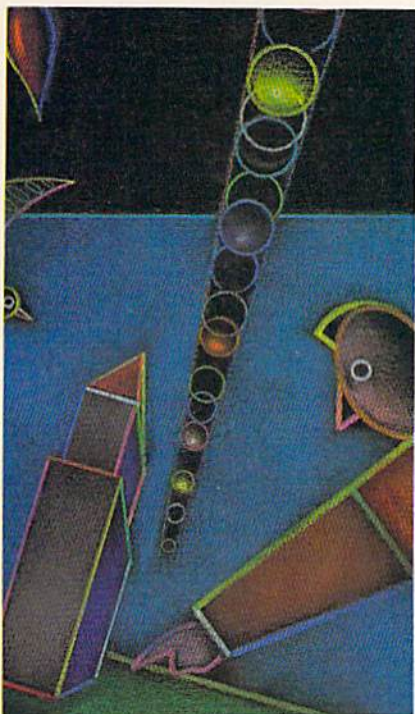
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COVER ILLUSTRATED BY R.M. SCHNEIDER

SCREEN SHOT CREATED BY JAMES HASTINGS-TREW



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RUNNING RUMINATIONS

WHILE WE GET many questions from readers on many subjects, we are sometimes inundated by calls, letters and electronic mail on a particular area, indicating unusual concern. Starting last summer, we began getting calls from irate and bewildered Commodore owners who have tried, unsuccessfully, to purchase the 1750 RAM expansion unit and the 1571 disk drive. Users of GEOS 128 were particularly incensed because the 1750 is a virtual necessity for them. Then dealers and distributors started calling, telling us they just couldn't get these products, and wondering if we had heard anything from Commodore. We had not.

In an effort to trace the problem, we called various individuals at Commodore, all of whom assured us that these devices were being manufactured and were available, and they were as puzzled as we that consumers couldn't get them. They did admit that large inventories were not maintained, and that only enough units were manufactured to meet the estimated demand for a given period of time.

At this writing, it is early January, and the shortage continues to be a major problem, fueling renewed rumors that Commodore is dropping the C-64 and C-128 computers. We again contacted Commodore and talked with Jon Winters, Vice President of the Consumer Products Division in West Chester, about these shortages.

According to him, Commodore remains committed to its C-64/C-128 line, but, just as with any other product, it is subject to the pressure of market forces. The 1750 problem is a good case in point.

As most people know, there has been a general shortage of RAM chips in the past year, and what has been available has become much more costly. Due to this, Winter explained, Commodore has had to make hard choices about what products to manufacture, and since the 1750 contains as much RAM as one Amiga 500, four C-128Ds or eight C-64s, they decided to concentrate on the computers rather than on the 1750. I was able to confirm that they did manage to ship some 1750s in the last quarter of 1988, but not enough to eliminate the shortage. They hope to produce and ship more as the chips become available.

As for the 1571 problem, Winter said there were drives in stock, but he couldn't say how many. Since the C-128D comes with a built-in 1571, the demand for single drives has diminished, so they manufacture fewer than before.

The editors and readers of *RUN* would of course like to see all these computers and peripherals produced for a long time into the future. But if, for business reasons, that cannot be, Commodore could greatly ease the problems this would cause by allowing third-party companies to buy the proprietary controller and ROM chips required to manufacture essential peripherals such as the 1571 and 1750. Such a move would allow the continued use of the millions of eight-bit computers for as long as they were needed.

*The peripheral
shortage is
real. . .but is
it lasting?*



Lou Wallace
Technical Manager

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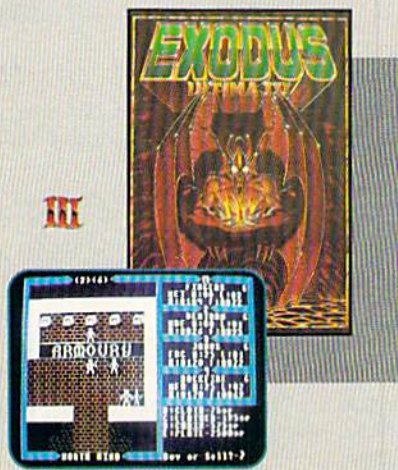
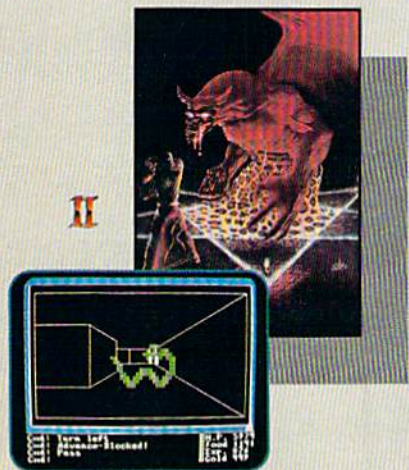
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\$50E DISK DRIVE RUNNING? DON'T TURN ON THE PRINTER!

Recently, while testing a serial Commodore-compatible printer for an upcoming *RUN* review, I broke a fundamental printer rule: I turned on the printer while a file was loading from disk. The result was a lot of garbage on the screen and a partially loaded file.

While it's unlikely that the disk drive could suffer any physical damage, turning on the printer while the drive is busy is potentially disastrous. If you unknowingly loaded in a file and corrupted it in the process, you might also inadvertently re-save it and lose the original. So always remember: Never turn on a printer while the drive is busy.

—TIM WALSH, *RUN* STAFF

\$50F AUTOBOOTING THE 1581

Commodore 128D owners who also own a 1581 disk drive face two problems if they want to autoboot or automatically activate a 1581 file. First of all, the C-128D's built-in 1571 disk drive has no DIP switches to reconfigure it with a different device number. Second, the built-in drive can't be de-activated to let the 1581 autoboot.

However, you can make an autoboot disk for the 1571 that boots the desired file from the 1581. Begin by writing a line of Basic such as:

```
10 RUN"1581 FILE",U9
```

(Of course, "1581 File" can be any 1581 file.)

Next, save this program as a file to your 1571 disk, then use the Autoboot Maker program from the 1571 Test/Demo disk to make that an autoboot file. Now, when you turn on your 128D with that disk in the 1571 drive and your second file in the 1581, the program will activate the desired file on the 1581. Many alternatives are possible, such as having autoboot files in both drives. In that case, an autoboot program in the 1571 drive need only consist of a line such as:

```
10 BOOTU9
```

This autoboots the file on the 1581. After you've done this a few times, it will be second nature to you.

—KEITH SILLS, REGO PARK, NY

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"Captain, she's going to break apart in the meteors!"

Meteor Dodge 64 places you in control of your own starship, indicated by the blue diamond on the screen, which you must pilot through a meteor shower. After you successfully maneuver your ship through a shower, the program goes to the next highest level, which has more meteors for you to contend with.

For those who like to tinker with programs, I'll list the

functions of the variables: SC is the score, S is the character position of the ship, C is the color of the ship, and L and X are the level and number of meteors per line, respectively.

```
0 REM METEOR DODGE - GARRET D. WILSON
:REM*161
10 PRINT "{SHFT CLR}{CTRL 7}":POKE53280,0:
POKE53281,0:SC=0:C=55316:DIM R(40):L=1:
X=10 :REM*17
20 S=1044:PRINT"{11 CRSR DNs}"TAB(16)"LEVE
L 1":FOR A=55316 TO 56295:POKE A,1:NEXT
:REM*44
30 FORN=1TO2000:NEXT:PRINT"{SHFT CLR}{30 C
RSR DNs}{CTRL 2}{CRSR DN}":FORT=1TO75
:REM*77
40 POKES,90:POKEC,6:SC=SC+1:FORG=1 TO X:R(
G)=(1984+(INT(RND(0)*40))):GOSUB120
:REM*190
50 POKER(G),42:NEXT:PRINT"{CRSR DN}";
:REM*208
60 IF PEEK(S)=42 THEN POKE C,6:GOTO 90
:REM*90
70 NEXT:L=L+1:PRINT"{SHFT CLR}{CTRL 7}{12
CRSR DNs}"TAB(16)"LEVEL"L:X=X+2:IFX>39
THEN X=40 :REM*239
80 GOTO 30 :REM*206
90 POKE S,102:FORN=1TO2000:NEXT:PRINT"END
OF GAME":PRINT"SCORE="SC :REM*170
100 POKE 198,0:INPUT"PLAY AGAIN (Y/N)";PA$
:IF PA$="Y" THEN RUN :REM*53
110 END :REM*238
120 GETM$:P=PEEK(56320) :REM*157
130 IF (M$=","ORP=123)ANDS=1024THENS=1063:
C=55335:M$="":POKE1024,32:POKE55296,1
:REM*137
140 IF M$=","ORP=123THENS=S-1:C=C-1:POKES+
1,32:POKEC+1,1 :REM*85
150 IF (M$="."ORP=119)ANDS=1063THENS=1024:
C=55296:M$="":POKE1063,32:POKE55335,1
:REM*46
160 IF M$="."ORP=119THENS=S+1:C=C+1:POKES-
1,32:POKEC-1,1 :REM*219
170 IF PEEK(S)=42 THEN POKEC,6:GOTO 90
:REM*232
180 POKES,90:POKEC,6:RETURN :REM*180
```

—GARRET D. WILSON, CHELSEA, OK

\$511 CARB CLEANER VERSATILITY

Should your printer stop printing one or more rows of dots in each character, you probably have a clogged print- ▶

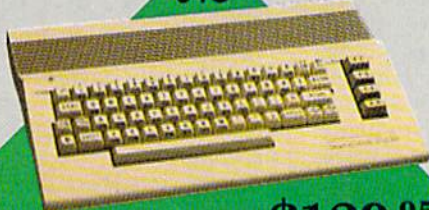
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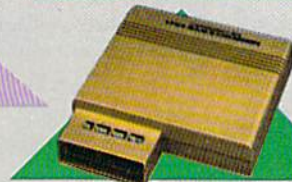
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MAGIC

head, caused by ink, dust, ribbon fabric and other contaminants. Don't rush out to buy a new printhead; instead, spray it with some carburetor spray cleaner or similar spray solvent.

Unbolt the printhead from the printer's carriage and unplug the wire connecting it to the printer. Place the printhead over a newspaper and spray the pins thoroughly with the cleaner. Then use an old toothbrush to scrub loose any matter clogging the pins. Continue spraying and scrubbing the printhead until it's clean.

Let the printhead dry thoroughly for at least an hour before re-installing. Chances are, it'll print like new once you re-install it.

—DWIGHT D. MOODY, GROTON, VT

\$512 64 KEYBOARD BUFFER EXPANDER

The C-64's keyboard buffer is a major limitation when used as a dynamic keyboard—it only has a capacity of ten characters. 64 Keyboard Buffer Expander is an interrupt-driven utility that expands the capacity of the keyboard buffer by 245 characters by relocating it to a new memory location.

After you've typed in and run the program, you can use and program it the same way you would the default buffer. With a 255-character limit, you'll want to incorporate this program into all of your dynamic keyboard routines.

```
Ø REM 64 KEYBOARD BUFFER EXPANDER - RICHARD PENN :REM*11Ø
1Ø A=88:B=255:C=56334:D=65535:POKE1,55:POKEC,PEEK(C)AND(B-1) :REM*84
2Ø POKEA+7,Ø:POKEA+8,16Ø:POKEA+2,B:POKEA+3,B:POKEA,B:POKEA+1,B:SYS41919 :REM*227
3Ø POKED,PEEK(D):POKEC,PEEK(C)OR1:POKEC-9,56:POKE1,53 :REM*3Ø
4Ø POKE588Ø5,Ø:POKE588Ø6,192:POKE5881Ø,1:POKE58811,192 :REM*17
5Ø POKE58813,Ø:POKE58814,192 :REM*146
6Ø POKE6Ø221,Ø:POKE6Ø222,192:POKE649,255 :REM*11Ø
7Ø REM DEMO BELOW :REM*247
8Ø PRINTCHR$(147)"EXPANDED KEYBOARD BUFFER DEMO" :REM*187
9Ø FORT=49152 TO 494Ø7:POKET,65:NEXT:POKE198,255 :REM*222
```

—RICHARD PENN, MONTREAL, QUEBEC, CANADA

\$513 64 KEYBOARD BUFFER REDUCER

If you write programs that prompt for user input, you might find the 64's default ten-character keyboard buffer to be a tad too big for some tasks. I've discovered a command that performs the functional opposite of the above trick. Just enter POKE 649,X in your program, where X is any value from 1 to 10 that determines the size of the C-64's keyboard buffer.

—JEN ST. CLAIR, BELLEFONTE, PA

\$514 GENERAL HINTS & TIPS

I thought it would be appropriate to pass along a few hints and tips on Commodore hardware that I've found useful, both at work and at home. First, if your 1581 sits atop another disk drive and slips around, get a bottle of window cleaner and a clean cloth. Flip the 1581 over and spray its feet with

the cleaner and wipe them clean. Next, spray and wipe the top of the disk drive it sits on. Voila! No more slipping and sliding.

Commodore 128 users, like myself, who have large fingers, might find pressing the recessed reset button an exercise in futility. I glued a wire nut sized for 12 and 14 gauge wire to the reset button using Crazy Glue and now can easily reset the computer.

Finally, to reduce heat buildup, I've placed hard plastic ten-disk diskholders under my computer's power supply and under the 1541 disk drive. I've also glued four 3/4-inch corks to the bottom of my 1541 disk drive for improved ventilation.

I hope RUN readers find these tips as useful as I have.

—PATRICK WEST, COLUMBUS, OH

\$515 A DIFFERENT KIND OF INPUT

Eliminate the question mark from all Input statements in both 64 and 128 programs by opening a channel to the keyboard. Both the C-64 and C-128 can use the command OPEN 2,0 to access the keyboard, so by writing an input routine, question marks following Input statements can be a thing of the past.

The following program demonstrates how to write an input routine that will eliminate the question mark in Input statements, yet work just like an Input statement.

```
Ø REM 64/128 NO QUESTION MARK INPUT - CHAD HELFENBERGER :REM*28
1Ø OPEN2,Ø :REM*83
2Ø PRINT"ENTER THE ANSWER TO 5 TIMES 5" :REM*115
3Ø INPUT#2,T :REM*216
4Ø IF T<>25THENPRINT"NO, "T" IS WRONG":CLOSE2:END :REM*238
5Ø PRINT"{CRSR DN}RIGHT, "T" IS CORRECT" :REM*6
6Ø CLOSE2 :REM*65
```

—CHAD HELFENBERGER, OWENSBORO, KY

\$516 C-64 FILE OPEN COUNTER

Whenever you need to know the number of files open on your C-64 or C-128 in 64 mode, just enter:

```
PRINT PEEK(152)
```

The number that appears is the number of files currently open.

—CHAD HELFENBERGER, OWENSBORO, KY

\$517 64/128 GREATEST COMMON FACTORS

As a math teacher, I've found my students often have difficulty finding the greatest common factor of a pair of whole numbers. I wrote the following program, 64/128 Greatest Common Factors, to quickly find the answer. As the name implies, the program works on both the C-64 and C-128.

```
Ø REM GREATEST COMMON FACTOR - TIM MCCAFFE RTY :REM*225
1Ø INPUT"LARGER #";L :REM*19
2Ø INPUT"SMALLER #";S :REM*14
3Ø IF L<S THEN RUN :REM*46
4Ø IF L<1 OR S<1 THENPRINT"NUMBER MUST BE GREATER THAN 1":RUN :REM*13Ø
```


MAGIC

```
50 IF INT(L/S)=L/S THENPRINT"GREATEST COMM
   ON FACTOR=";S:END :REM*49
60 FOR J=2 TO INT(SQR(S)) :REM*196
70 IF INT(L/J)=L/J AND INT(S/J)=S/J THEN G
   CF=J :REM*107
80 IF INT(L/(S/J))=L/(S/J)GOTO 110 :REM*81
90 NEXTJ :REM*113
100 GOTO130 :REM*170
110 PRINT"GREATEST COMMON FACTOR = ";S/J
   :REM*203
120 END :REM*248
130 PRINT"GREATEST COMMON FACTOR = ";GCF
   :REM*42
```

—TIM MCCAFFERTY, FLORENCE, AL

\$518 FLASHY 64 DISK LOADS

Make loading programs more interesting and less boring by using Flashy 64 Disk Loads in either Direct mode or in your programs. After typing in and running the program, whenever the disk drive loads a file, the C-64's screen border will rapidly cycle through all 16 colors until the drive stops.

The interrupt-driven program won't be affected by most other programs. Pressing the run-stop/restore key combination will disable it, while POKE 1,53 will re-enable it.

```
0 REM C-64 FLASHY DISK LOADS - RICHARD PEN
   N :REM*193
10 A=88:B=255:C=56334:D=65535:POKE1,55:POK
   EC,PEEK(C)AND(B-1) :REM*84
20 POKE A+7,0:POKE A+8,160:POKE A+2,B:POKE
   A+3,B:POKE A,B:POKE A+1,B:SYS 41919
   :REM*227
30 POKE D,PEEK(D):POKE C,PEEK(C) OR 1:POKE
   C-9,56:POKE 1,53 :REM*30
40 FOR T=679 TO 679+8:READ D:POKE T,D:NEXT
   :REM*25
50 DATA 238,32,208,120,169,0,76,22,238
   :REM*244
60 POKE 60947,76:POKE 60948,167:POKE 60949
   ,2 :REM*40
```

—RICHARD PENN, MONTREAL, QUEBEC, CANADA

\$519 RIBBON STORAGE TIPS

Here's a handy tip for both new printer ribbons and color ribbons that are used infrequently: Store all nylon and fabric printer ribbons in resealable plastic bags. You'll find that they won't dry out as soon as they will when sitting in their original boxes or in the printer.

—DON ENGLERT, GREEN RIVER, WY ■

Magic is a forum for RUN's imaginative and inventive readers to share their programming tips, brief software or hardware modifications, shortcuts or items of general interest. If you have an idea to make computing easier, faster, more exciting and enjoyable, send it to: Magic, RUN Magazine, 80 Elm St., Peterborough, NH 03458.

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NEWS AND NEW PRODUCTS

New products for March have come in like a lion, from timely tax programs to sketchpads and games for your C-128 and 64.

Compiled by HAROLD R. BJORNSEN

SHOGUN AND ZORK

CAMBRIDGE—It's the 16th century and you're John Blackstone, an English sea pilot who finds himself in the foreign and exotic Japans. You're thrust in the upper echelons of feudal Japanese society at the moment a political power struggle is erupting between two Japanese regents who aspire to be Shogun. The action revolves around this struggle, which influences and ultimately controls your life. Shogun, a game for the C-128, is available for \$49.95.

Zork Zero, the prequel to the Zork trilogy, covers a century of time and explores the collapse of the Great Underground Empire. The game has more than 200 locations and as many puzzles as in all of the Zork trilogy. As the game opens, the Flathead family, rulers of the kingdom, has already been destroyed. Your challenge is to save the rest of the kingdom from the fated curse that Megaboz, the evil wizard, has cast. Zork Zero is available for the C-128 for \$49.95. Infocom, 125 Cambridgepark Drive, Cambridge, MA 02140.

Check Reader Service number 400.

HOLD ON TO YOUR WALLET

TWO HARBORS, MN—Taxaid, an income tax preparation program for the C-64, includes all the current changes in the tax laws for the tax year 1988. It prepares Form 1040, Schedules A, B, C, D, E, SE, and Form 2441 (Child Care). Calculations are automatic and all tax tables are built in. The program is completely menu driven. It costs \$49.95 from Taxaid Software, Inc., PO Box 100, Two Harbors, MN 55616.

Check Reader Service number 404.

PREHISTORIC COLORING BOOK

BATAVIA, IL—Polarware (1055 Paramount Parkway, Suite A, Batavia, IL 60510) has released Dinosaurs are Forever, an educational coloring book for the C-64. Your child is the artist, who can choose his or her own colors to color in each

Children can color up to 22 dinosaurs in Polarware's Dinosaurs are Forever.



dinosaur. The child will learn how each dinosaur evolved, its approximate weight and size, and its eating habits. The program also makes banners and posters. There are 22 line drawings of different dinosaurs and 16 colors on the color palette. It's available for \$29.95.

Check Reader Service number 401.

BIG BROTHER'S WATCHING YOU

RANDALLSTOWN, MD—Master Software (6 Hillery Court, Randallstown, MD 21133) has released its 1988 version of Tax Master to help aid in the preparation of U.S. Federal Income Taxes. It covers all the confusing new tax laws and guides you through the preparation of Forms 1040 and 4562 (Depreciation), and also Schedules A (Itemized Deductions), B (Interest and Dividends), C (Small Business), D (Capital Gain/Loss), E (Rent/Royalty Income/Loss), and F (Farm Income/Loss). Tax tables are also included, and the program figures your tax automatically, performs all calculations and can transfer results from one tax form to another. Tax Master is fully menu driven and is available for the C-64 for \$32.

Check Reader Service number 402.

CONQUER THE TEMPLE OF DEMONS

SAN JOSE—Victory Road, the arcade sequel to Ikari Warriors, has been released for the C-64 by Data East USA (470 Needles Drive, San Jose, CA 95112). The sequel continues the quest of the two heroes from Ikari Warriors to battle fearsome enemies and conquer the Temple of Demons. Using an assortment of weapons, the player must fend off bizarre enemies to successfully complete all four levels of the game. \$29.95.

Check Reader Service number 405.

SKETCHPAD 128

KUTZTOWN, PA—Free Spirit Software (PO Box 128, Kutztown, PA 19530) has released Sketchpad 128, a drawing system for the 128's 80-Column mode and 1351 mouse. Sketchpad can be used to create artwork, slideshows, signs, posters and letterheads. Features include a selection of drawing tips, 3-D solids, fill patterns, type fonts, and pixel and grid editors. In addition, the program is completely menu driven, enlarges and scrolls screens and supports 64K video RAM and the 1581 disk drive. \$17.50.

Check Reader Service number 406.

YES, BUT CAN YOU BEAT UP THE REFEREE?

NEWARK, DE—Two volumes in the World Wrestling Federation SuperStars series are now available for the C-64 at \$19.95 each. Volume 1 pits the Honky Tonk Man against Randy "Macho Man" Savage in a fight for Elizabeth's affection. A second match has "Hacksaw" Jim Duggan battling



NEW from Digital Solutions

King Harley Race. In Volume 2, Match 1, Hulk Hogan faces Ted DiBiase, the "Million Dollar Man." Match 2 has Ravishing Rick Rude squaring off against Jake "The Snake" Roberts and his snake. In all matches, you apply your managerial and directorial talent to bring your man to victory. The ML/WWF Game-Match disk is required. MicroLeague Sports, 2201 Drummond Plaza, Newark, DE 19711.

Check Reader Service number 407.

OUT INTO OUTER SPACE

GLEN ROCK, NJ—Absolute Entertainment (PO Box 116, Glen Rock, NJ 07452) has released Garry Kitchen's Star* Fighter, a high-speed, space-flight simulator for the C-64. It provides you with an intergalactic fighter armed with particle lasers, photon torpedos and heat-seeking missiles, an on-board computer system, shields, scanning capability and computerized maps of interstellar space. With these, the player who can combine cunning, caution and good judgment will find that success brings riches and power. \$34.95.

Check Reader Service number 409.

VOLLEYBALL IN ZERO GRAVITY

PONTIAC, MI—In Zero Gravity, an arcade game for the C-64, you're on a journey into the farthest reaches of space in the year 2189. But travel through space can be boring, so Zero Gravity, a game similar to volleyball, was developed. In the two-player game, the ball can careen off the bulkheads at strange angles, and panels along the sides can be struck at different times to add or subtract points from your score. It's available for \$29.95 from MichTron, 576 S. Telegraph, Pontiac, MI 48053.

Check Reader Service number 408.

HIGH-SPEED WP

DEERFIELD, IL—GEOS Writer 64, a word processor for the C-64 and GEOS 1.3 or later versions, features a Preview mode to display your document on-screen exactly as it will appear on the printed page; a 100,000-word spelling checker; a variety of built-in, special effect fonts; and high-speed text entry that, according to the manufacturer, is five times faster than other GEOS-based word processors. In addition, the program lets you use a mouse, joystick or the keyboard to move around a document and select editing and formatting options. It's also compatible with geoPaint and geoWrite so that you can import all GEOS fonts and graphics into your documents. Available for \$39.95 from Timeworks, Inc., 444 Lake Cook Rd., Deerfield, IL 60015.

Check Reader Service number 415.

OFF TO THE WARS

MOUNTAIN VIEW, CA—Typhoon of Steel, a sequel to the Panzer Strike! war game, covers the Pacific, Asian and European theatres, involving American troops versus German troops. The tactical game includes many different kinds of ground weapons, from tanks, tank destroyers and artillery to trucks, mortars and machine guns. Pillboxes, minefields, dragon's teeth, flamethrowers and naval gun support are also included. Players can choose to simulate single battles or an entire campaign. The objective is to win as many battles as possible before the war ends. Available for the C-64 for

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157 DUNGEON LEVELS

SAN MATEO, CA—Deathlord, a fantasy role-playing game for the C-64, has you storming 157 dungeons, facing 128 different kinds of monsters, exploring 16 separate continents, mastering 84 magic spells, and dealing with the problems posed by changing climate, weather and the time of day. You create your own characters but may also transfer characters from The Bard's Tale, Wizardry I, II and III and Ultima II role-playing games, and use them in 16 character classes. The Deathlord had besieged the Emperor of Kodan and claimed the Empire for his own. You and your party must restore peace to the land. Begin your adventure for \$29.95 from Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404.
Check Reader Service number 412.

GUT-BUSTING KARATE ACTION

MENLO PARK, CA—Chop and Drop, a karate action game for the C-64, has been released by Activision (3885 Bohannon Drive, Menlo Park, CA 94025). The one-player game has two karate characters on the screen at all times, and the two-player game has three. To earn points, you must use a combination

of 16 different karate blows to knock down your opponents as many times as possible in timed rounds. \$29.95.
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\$#!%&!%\$#!

BELLINGHAM, WA—What do you do when your computer goes awry? Push the panic button. The bright red computer key is imprinted with the word PANIC, and its adhesive backing lets you mount it on any computer keyboard key. The buttons are available for \$1 each plus an SASE. For 10 orders or more, Memory Makers (3024 Haggin St., Bellingham, WA 98226) pays postage.

Check Reader Service number 414.

WE LOVE TO BE ONLINE

MOUNTAIN VIEW, CA—A report released by Market Intelligence Research Company says that the online database market, which was only slightly over \$1.3 billion in 1984, more than doubled in size to reach over \$2.6 billion in 1987. Outstanding growth will continue, according to MIRC, with annual growth rates exceeding 20 percent, and market revenues are projected to reach over \$11.7 billion in 1994.

The number of subscribers is expected to show similar growth, from around 283,000 in 1984, to nearly 540,000 in 1987, to over 2.1 million in 1994. ■

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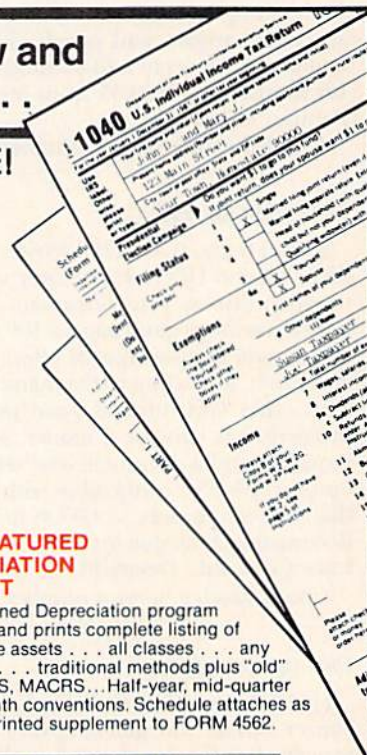
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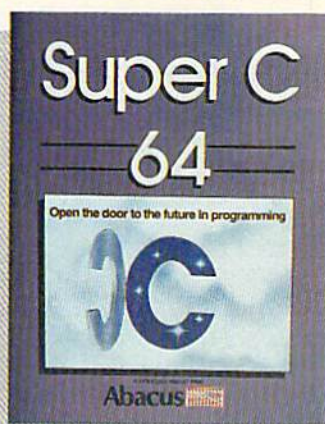
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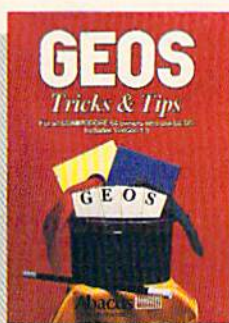
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SOFTWARE GALLERY

'Tis the luck of C-64/128 owners this month that brings reviews of sports, fantasy, music and trivia programs, and much, much more!

Compiled by BETH S. JALA

TOWER TOPPLER A

*Going Up? Next Stop...
The Top Floor!*

Just when you thought you'd seen every possible variation of the arcade-style climbing contest, along comes Tower Toppler to throw you a curve—in more ways than one. The object of this game is to destroy eight towers that loom high above a toxic ocean. To do so, you must mount the treacherous spiral staircase that winds around the outside of each tower, and eventually reach the top.

Of course, some of the steps are rather slippery, others crumble beneath your feet and some are missing. At various points, you can take advantage of outside elevators that bring you part of the way up to the top. In other places, you must enter doorways only to re-emerge on the opposite side of the tower to continue the climb.

You also have to contend with flying eyeballs, mutant molecules, indestructible rolling cannon balls and deadly flashing blocks. Each of the eight towers is more difficult to scale than the one before. Their names—Tower of Eyes, Realm of Robots, Broken Path, Slippery Slide, and so on—give some indication of the type of trouble you can expect. To survive, you must be sure-footed and a good shot with your only weapon, a snowball gun that's capable of destroying many of the obstacles.

Tower Toppler boasts some of the most impressive animation I've seen in a long time. As your joystick-controlled character—an adorable green head with big eyes and tiny legs—climbs the winding stairs to the top of the tower, your perspective smoothly shifts to keep him in the center of the screen. Thus, the tower, along with the star-filled background, rotates as the green guy moves to the left or right. In addition, simultaneous vertical movement by the on-screen character results in smooth vertical scrolling of the tower.

Tower Toppler is the type of game

that's almost as much fun to watch as it is to play. In fact, because the game demands your undivided concentration to scale its eight colorful towers, it might be impossible to fully appreciate the sharp graphics and smoothly animated action except as a spectator. (Epyx, 600 Galveston Drive, PO Box 8020, Redwood City, CA 94063. C-64/\$39.95.)

—BOB GUERRA
SOUTH BOSTON, MA

OUT RUN B+

*Rev It Up in
Road Rally Racing!*

A powerful car + splendid sound + fantastic graphics = one hit game. This is the formula Sega employs for the arcade version of Out Run, and the same elements have been included in the C-64 adaptation.

The program offers five different courses and each is divided into four sections. Only by completing one stage within a predetermined time can you



Cool car, solid sound and groovy graphics characterize Out Run.

advance to the next. Failing to do so forces you to start back at a course's beginning in a new game.

Making the trip difficult are the cars and trucks that you overtake when traveling at up to 295 kilometers per hour; running into them costs precious seconds. Hitting the trees and structures that border the highways at top speed results in a spectacular tumbling wreck. After a crash, you and your car miraculously recover and continue from that point, but you've lost valuable time and momentum.

Points are awarded for fast driving. Out Run also gives a special bonus for completing a course. During each session, the program displays the top seven scores with their owners' initials, although none of this data is saved to disk.

You use a joystick to steer, accelerate and brake your auto, and pressing the button shifts between gears. This arrangement is surprisingly effective, especially considering that the program's coin-operated model was equipped with a steering wheel, gas pedal and gear shift lever.

Out Run's sound effects are excellent. While there is an option to turn off all game noises, you'll probably want to hear one of the two pulsating background themes. Equally well done are the car sounds, like the screech of tires as you fight to keep control when rounding a curve. ▶

REPORT CARD

A Superb!

An exceptional program that outshines all others.

B Good.

One of the better programs available in its category. A worthy addition to your software library.

C Average.

Lives up to its billing. No major hassles or disappointments here.

D Poor.

This program has some problems. There are better on the market.

E Failure.

Many problems; should be deep-sixed!

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The software's graphics are even better, filled with exotic scenes painted by bright and continually changing colors. Sega has also done a tremendous job with the game's animation; it gives the exciting illusion of racing at breakneck speed.

Yet, for some players, all of this sensory richness won't be enough. In particular, those who enjoy the mental challenge of devising elaborate tactics might best look elsewhere. Fast reflexes, instead of heavy thinking, are needed to win in this contest.

Nevertheless, Out Run does deliver what its package promises: "Hot car. Hot music. Sensational scenery." For hundreds of thousands of racing fans, that's enough to guarantee that Sega's gaming formula is as big a success on the C-64 as it is in the arcades. (Sega; distributed by Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062. C-64/\$34.95.)

—WALT LATOCHA
OAK PARK, IL

FAST BREAK B+

*"He Steals the Ball,
Runs the Length of the Court,
and... Swish!"*

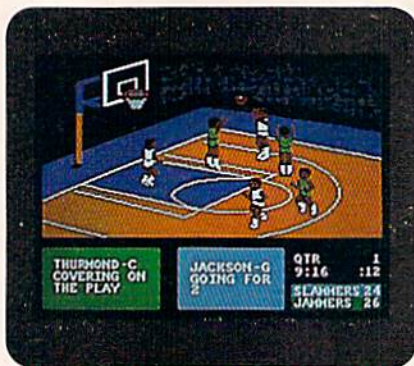
Think of Fast Break as Accolade's version of an in-your-face slam dunk. It might not shatter backboards in any one area, but it does feature a combination of attributes worthy of a champion. It's an impressive program that should score plenty of points with roundball fanatics.

Fast Break hits from three-point range with its graphics and life-like animation. The on-screen players are as clear and well-defined as any sports simulation I've seen; no flickering images here.

Players move smoothly up and down the court, realistically running, jumping and shooting. They also respond fairly quickly and accurately to joystick input.

But Fast Break isn't only about slam-bam action and quick reflexes. It's also a strategy game that lets computerists choose the players on their team and select the plays they'll run. Other features include competing against the computer or a friend, playing quarters that last from three to 12 minutes, or opting for the Practice mode.

The rules in Fast Break are essentially the same as in the NBA. Six fouls and a player is ejected from the game. Teams have 10 seconds to get the ball past half-court and 24 seconds to take



Information boxes on the bottom of the Fast Break screen keep you abreast of what's happening on the court.

a shot. Unlike real basketball, however, there are no foul shots, nor are there any walking or double dribble violations, and you can't throw or dribble the ball out of bounds.

Fast Break is a full-court game, but only one half of the court appears at any time. Players who happen to be on the half of the court opposite the ball aren't visible and are therefore difficult to control.

While perspective is good, there's one minor problem. Since there's virtually no horizontal scrolling, it's a little disconcerting when a player moves from one half of the court to the other. The screen seems to go blank for a split second, and then the players and court reappear.

One player per team can be controlled by the joystick at any time. This player flashes to distinguish him from his teammates. On offense, the joystick controls the player with the ball. On defense, the joystick controls the player closest to the ball at a change of possession, but a quick jab at the firebutton shifts control to the other two players in sequence. Because operation is logical and intuitive, it doesn't take long to get used to Fast Break's controls.

There really is a noticeable difference in the performance of the players. Some shoot better, run faster or rebound more strongly than others. So, it's important to keep an eye on the information boxes at the bottom of the screen, which identify the man with the ball and his defender. It's also wise to make substitutions, since minutes played affect performance.

That's what you call attention to detail. And it's details such as those that make Fast Break a class act. (Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128. C-64/\$29.95.)

—SCOTT WASSER
WILKES-BARRE, PA

OCEAN RANGER B

*Dangerous Reconnaissance
Activity from the Safety
Of Your Computer Room*

Ocean Ranger puts you in command of a modern hydrofoil patrol craft and offers you a variety of missions. Your assignments include Basic Training Duty, Regular Forces Duty, Central Intelligence Agency Duty and National Security Council Duty, and you can patrol four increasingly hazardous areas of the world—the Bering Sea, Southeast Asia, Central America and the Persian Gulf.

Each mission involves destroying a primary and a secondary target. A single target might be an entire squadron of Soviet MIGs or a small fleet of enemy destroyers. Other targets include submarine packs and underwater mines. You're given a set of coordinates for each target within the general area you're patrolling.

To eliminate the primary and secondary targets, as well as any enemy threats you'll face en route, the Ocean Ranger is equipped with several types of weapons, including a 76mm cannon, Sea Sparrow surface-to-air missiles, Harpoon missiles and depth charges. In addition, chaff rockets and ECMs (Electronic Counter Measures) can be used to throw incoming radar-guided missiles off your trail.

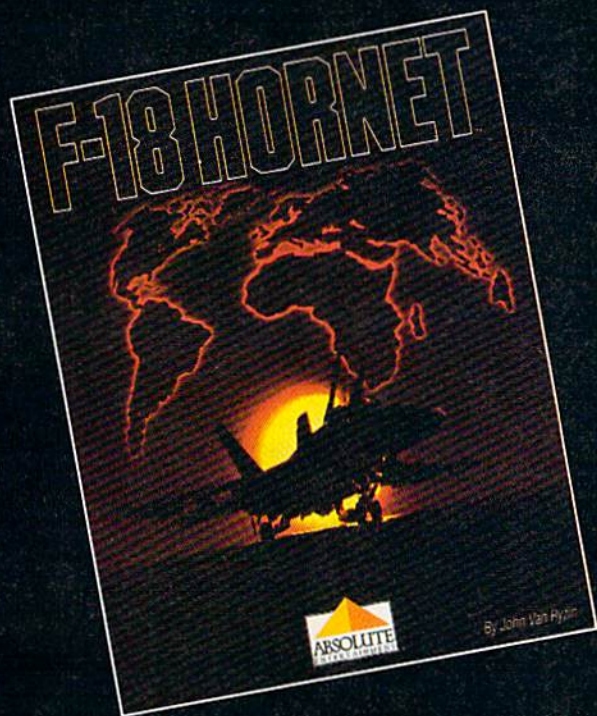
You have a choice of several main displays: the view from the bridge facing the bow, stern, port or starboard sides of the boat; damage and maintenance reports; or a tactical, area or coordinate chart. In addition to the main display, two small monitors at the bottom of the screen can be set independently to any of seven channels. Unfortunately, most of these displays are more decorative than functional.

Ocean Ranger comes with a Captain's Manual that contains complete instructions for commanding your ship, along with the security codes needed to access the personnel-records screen and to begin the game. These codes serve as copy protection for Ocean Ranger; the disk can be backed up using the program's built-in copy utility. Also included in the game package is a keyboard overlay that makes a snap of finding the correct weapon and navigation keys.

Although Ocean Ranger has a bit of an arcade feel, on the most difficult levels, it gives even veteran hydrofoil captains more action than they can handle. In addition, it lets you start as a Lieuten- ▶

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SOFTWARE GALLERY

ant and work your way up to the rank of Admiral, earning medals and service ribbons along the way. (Activision; distributed by Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. C-64/\$34.95.)

—BOB GUERRA
SOUTH BOSTON, MA

BARBARIAN B

*A Better Barbarian
Has Barely Been Born!*

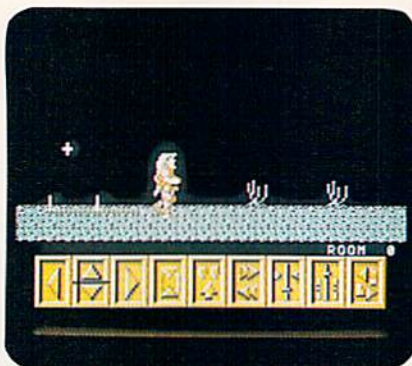
After playing the fantasy arcade game Barbarian, any C-64/128 owner considering the purchase of a Nintendo or other game system should certainly reconsider. After all, why invest hundreds of dollars in a dead-ended, cartridge-based machine when the very types of programs one is looking for in a game system are available on disk for one's own computer?

Thematically, Barbarian breaks no new ground. In the role of Hegor the Barbarian, the great dragonslayer, you must enter an underground world to do battle with your father's murderer, the evil Necron. Along the way, there are numerous screens to traverse, treasures to secure, traps to avoid and monsters to kill. The quest doesn't end with the defeat of Necron, however. Other tasks must be accomplished, including returning to the surface before the underground volcano blows.

Barbarian's graphics and animation are first-rate. A variety of evil characters populate this world, all clearly and colorfully drawn, and each type possesses individualized movements. Hegor travels smoothly from screen to screen against vivid, sharply etched backgrounds. Occasionally, he appears to be floating up steps, and the arrows he picks up look more like miniature columns, but these are relatively minor flaws.

One characteristic that sets Barbarian apart from its arcade-like competitors is the uniqueness of its control system, manipulated by either joystick (recommended) or keyboard. By positioning the cursor over any one of a series of icons located on the bottom of the screen and clicking the joystick button, you can access a variety of action commands.

This system tends to be a bit cumbersome on the C-64, possibly due to the game's origins as a mouse-controlled product for the Amiga and the Atari ST. The process is made easier, however, by the logical layout of the icons in relation to each other, and by letting the user control Hegor's walk-



Clicking on icons is the way you control Hegor in Barbarian.

ing, climbing, turning and stopping by placing the cursor in front of, behind, above or below the figure. That way, if you foresee disaster, you don't have to go looking for the appropriate icon in order to stave it off. My only complaint here is that Hegor seems to have his own mind at times, particularly when it comes to going up or down ladders.

Since there is no save-game feature, by the time Hegor reaches Necron, the average player should have almost every screen memorized. Nevertheless, mapping this relatively compact (48-room) underground world is recommended because you only have a limited amount of time to escape once your tasks are completed. A definite drawback to Barbarian is that it could have little replay value once your quest is concluded.

One very nice feature appears after you've used up the last of your four lives: The program informs you of the percentage of rooms you have explored. With the knowledge that with each game your percentage is improving, you begin once more to journey forth.

So, if it's attractive graphics, graceful animation and exciting game play you're after, hold off on buying that game machine, and instead put some of that money toward the purchase of Barbarian. (Melbourne House; distributed by Mastertronic International, Inc., Mesa Business Centre, Unit G9, 711 West 17th St., Costa Mesa, CA 92627. C-64/\$29.99.)

—LEN POGGIALI
SYRACUSE, NY

THE MAESTRO B—

*Music, Maestro,
Please!*

The Maestro is a music program that uses the C-64's three-voice SID (Sound

Interface Device) chip to play musical compositions in a variety of keys and time signatures. It's ideal for anyone familiar with musical notation who needs a way to turn printed sheet music into code the SID chip can play.

Music is entered, one measure at a time and one voice at a time, by moving a joystick-controlled cursor to the appropriate space on the musical staff and pressing the firebutton. Pre-programmed changes in tempo, volume and voicing can also be entered.

The Maestro's music-entry screen actually displays two staves: a treble staff for entering notes with a pitch of middle C or higher, and a bass staff for notes below middle C. As you might expect, vertical placement of a note determines its pitch. What's interesting about The Maestro's system of musical notation, however, is that note duration—whether a note is a 32nd, a 16th, an 8th or a quarter-note—isn't determined by the shape of the note as it is in standard notation, but rather by where the note is horizontally placed on the staff. Notes don't even appear on the one-measure staff as they're selected; instead, the note's letter name, octave and duration are listed below the staff.

After each note is selected, the staff is replaced by an Adjustments Menu that lets you alter the basic pitch and duration of the note by dotting it, making it a sharp or a flat (or natural if the key signature already designated the note as sharp or flat), raising or lowering the note's pitch by an octave, changing it to a triplet, or tying it to another note. Once all of the notes and rests for a single measure of one voice are entered, you get to review the list of notes and approve the current measure before moving on.

For each of your three voices, you can select one of eight pre-programmed instrument sounds: piano, reed, harpsichord, xylophone, organ, guitar, strings or brass. While none of these could ever be mistaken for the real instrument, they do offer a nice variety of timbres with which to arrange your compositions.

In addition, The Maestro comes with a separate utility that lets you create new sounds by selecting the waveform, setting the pulse width and defining the ADSR envelope. Unfortunately, other parameters controlled by the SID chip such as filtering and ring modulation, aren't adjustable through this utility.

You should also be aware of some of the program's other minor limitations. First, The Maestro has no MIDI capabilities, so if you have a MIDI-equipped synthesizer or are planning to buy one,

SOFTWARE GALLERY

you won't be able to use it with this program. Also, since it's designed basically as a tool for entering sheet music into your C-64, the designers felt it unnecessary to include an option that lets you print your music.

Finally, some users might have a problem with The Maestro's system for designating octaves. Usually, when you have eight octaves labeled zero through seven, zero represents the octave that's lowest in pitch and seven designates the highest. This is how things work within the aforementioned utility, but the system is exactly opposite within the main program.

On the plus side, The Maestro is not copy-protected, and it comes with 24 demonstration compositions right on the program disk, as well as an indexed, 66-page user's manual. The manual isn't slickly produced, but it's well-organized and does a thorough job of taking you through the various functions of the program. (*Zwetzig Associates, 5932 Bruns Court, Oakland, CA 94611. C-64/\$24.95.*)

—BOB GUERRA
SOUTH BOSTON, MA

Editor's Note: To give our readers more coverage of the many C-64/128 software products available, RUN is broadening the scope of Software Gallery by presenting more reviews in capsule form.

RASTAN **B**

You are Rastan, a mighty warrior in an ancient land, and you must defeat an evil king. While this plot is sure to be familiar to arcade gamers, there is much to make the program stand out from other sword-and-sandal offerings: the graphics—characters are bright, colorful and well defined; the scrolling—smooth, almost seamless; the response to joystick movement—crisp. This is a game that relies more on good hand-eye coordination than fast reflexes—timing is everything.

Rastan autoboots on a 128 and then configures the computer, via software commands, to 64 mode—that's a nice touch. Another plus is that the player is given the choice of music or sound effects during game play.

Regrettably, however, Rastan returns to the days of heavy-duty copy protection. Although my 1541 drive's heads may not be in perfect alignment (whose are?), Rastan is the only piece of software I have that won't load. It loaded from both of my 1571 drives, but only after I removed my 128's RAM expan-

der. Rastan also failed to load with a fast load cartridge.

One other minor complaint involves the names of the enemies. Most are given names of creatures associated with terror or evil. However, two names, the "many armed bug" and the "fish," seem to indicate that the authors ran out of imagination. Those names just don't cut it for a deadly daddy long-legs and a killer carp.

Pleasant to look at and a pleasure to play, Rastan is an arcade game for those who want a program that requires more than just a fast thumb and a strong joystick. (*Taito Software, Inc., 267 West Esplanade, North Vancouver, British Columbia, Canada V7M 1A5. C-64/\$34.95.*)

—MICHAEL CAVANAUGH

BOOT CAMP **C+**

A military training and combat game for one or two players, Boot Camp turns your joystick into a physical development tool. Certain parts of this game require you to furiously waggle your joystick, and it is the speed of your waggle that determines your success in completing Chin Ups, the Assault Course and the Iron Man Race. Exhaustion and non-completion of sections send you back to the Assault Course to begin all over again.

I would've rated Boot Camp higher if starting over at the beginning hadn't been mandatory. I found it tiring and unrealistic not to be able to choose one event and stick to it.

The game's graphics stand out with sharp, realistic detail and good sound effects, ranging from "gung-ho"-type music to grunts and thuds.

I don't recommend this program to "couch potatoes." However, if you own a joystick with a good hand grip, and if you love a grueling workout, then go ahead, make your day! (*Konami, Inc., 815 Mittel Drive, Wood Dale, IL 60191. C-64/\$29.95.*)

—JOHN DIPRETE

ENLIGHTENMENT **C-**

There's a lot of "good stuff" in Enlightenment: fast action, a challenge for quick reflexes and a colorful terrain. I can't ignore a host of wonderful spells, 15 difficulty levels or the two-player feature. And, the graphics deserve passing grades while the musical interludes offer beautiful Canterbury themes.

However, I didn't like several aspects of Enlightenment. You start the game as a Druid and only get one chance as that character. Unfortunately, I sometimes died while simply standing around, debating my next move.

Joystick control lacks some precision. I had to position myself exactly on a spell site, sometimes over and over again before I could pick up a spell.

The game doesn't proceed in real time. After you've eaten a meal, you're suddenly informed that you need more food. A few seconds pass and you're told it's chow time again. Apparently, a Druid eats a million square dinners a day!

Some folks might like this game, but players looking for more direct adventuring would probably prefer something else. (*Rainbird Software; distributed by Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. C-64/\$19.95.*)

—JOHN DIPRETE

TICKET TO HOLLYWOOD **B**

Blue Lion Software has transformed movie lore into a computer trivia contest.

The game's graphics are well-drawn, although not very elaborate, and the sound effects are also rather limited. However, these sensory elements adequately fulfill their "supporting roles" as decorations for the quizzes.

The software tests you on an interesting array of facts—some easy, others rather obscure. Unfortunately, some players will quickly be able to memorize most of the game's answers, although the different types of questions do give the program more staying power.

The most impressive feature of this game is undoubtedly its control system. Primarily based on menus that are accessed by keyboard, joystick or mouse, it makes the game fun and extremely user-friendly. A Save function that keeps track of the progress of up to eight players is also included.

A few older copies of Ticket to Hollywood have one minor flaw that involves obtaining the final clues. Owners of software with this problem can find the clues by merely going to the game's review screen or getting a free replacement disk from Blue Lion.

This program should fascinate anyone who has even a casual interest in films. And, judging by the continuing boom in video rentals, that audience probably includes most C-64 owners. (*Blue Lion Software, 90 Sherman St., Cambridge, MA 02140. C-64/\$29.95.*)

—WALT LATOCHA ■

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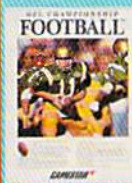
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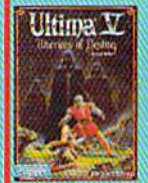
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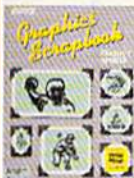
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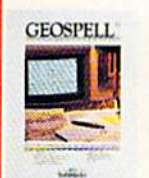
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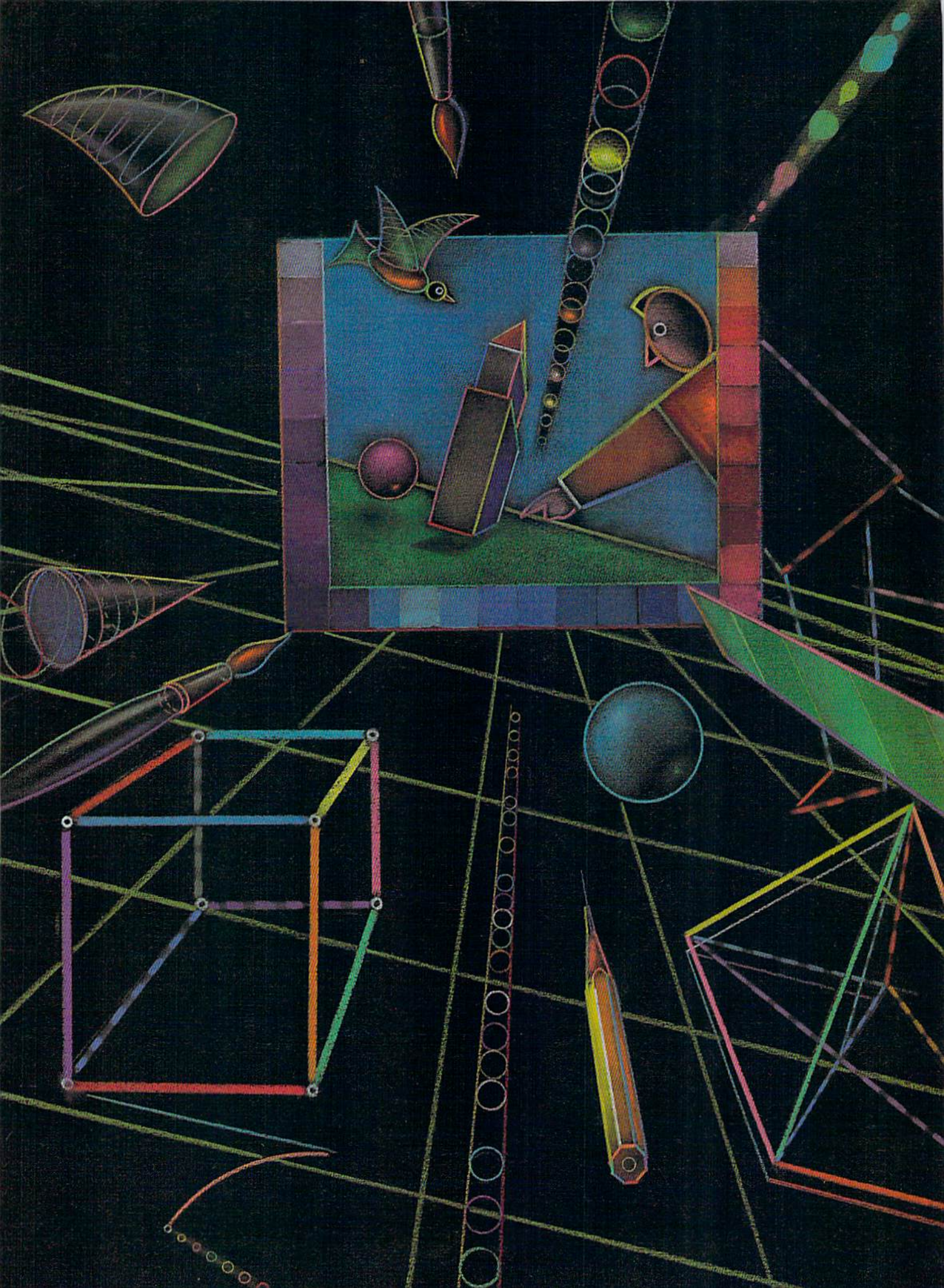
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RUN Paint

Here is easily the most advanced, powerful and easy-to-use draw and paint program ever published in a magazine for the C-64 or C-128.



UN Paint is a sophisticated, joystick-based paint program that lets C-64 and C-128 users create and print out bit-mapped graphics. It runs in 40-Column mode and uses both hi-res and multicolor screens. An easy-to-use system of nested, pop-down menus makes it unnecessary to study and memorize sets of complicated commands or to continually refer to the documentation.

Getting Started

RUN Paint is presented here as four program listings. Before using the program, you'll need to type in all four listings (use RUN's Checksum program) and save them to a disk that we suggest be new and freshly formatted. All the listings are in a hexadecimal data format. It is important to name them only as indicated and not as the actual programs that they will create. So Listing 1 should be saved to disk with the name LISTING1, Listing 2 as LISTING2, and so on.

Once you've typed in all four programs, you can begin to create the actual RUN Paint files. (Make sure the Checksum program has been disabled before running any other programs.) Load LISTING1 and, with your RUN Paint disk in the drive, run it. Your disk light will come on, and there will be a brief amount ▶

By ROBERT ROCKEFELLER

RUN it right: C-64 or C-128
(in 40-Column mode); joystick or 1351 mouse

of disk activity while it creates the actual RUN Paint file.

After a few minutes, you'll get your cursor back, and the familiar READY prompt will appear. Repeat this for LISTING2 through LISTING4. Depending on the size of the listing, the time required to create the files on disk will vary. Just be patient and wait until the READY prompt reappears.

Before starting to use RUN Paint, make sure you have a joystick or 1351 mouse plugged into port 2 (do not plug them in with the power on). Then turn on the computer. RUN Paint defaults to a joystick in port 2, so if you're using a 1351 mouse instead, press the F3 key at this point. Pressing F1 will reselect the joystick.

To start RUN Paint in either 64 or 128 mode, just load the program called RUNPAINT and run it. After half a minute or so, the screen clears and a flashing arrow appears in the center. The arrow is a pointer that you move around with the joystick or mouse to make menu selections and to draw on the screen.

The rest of this article will take you step by step through each of RUN Paint's functions. By the time you've finished, you'll have a good working knowledge of the power and sophistication of this program. After that, you can use the documentation as a reference guide.

The Menu System

You can't draw anything until you select an option from a menu. To activate the menu system, move the pointer at least five pixels above the top of the screen border and press the firebutton. When the main menu appears, select one of the options thereon by moving the pointer onto it and pressing the firebutton. This operation is known as "clicking." Take care not to move the pointer off the menu until you're finished with it, because the menu will then disappear.

Clicking an option displays a submenu from which you can make further selections. Some of the submenu options perform an action, and some make yet another submenu pop down. Accessing some of RUN Paint's features requires descending through three levels of submenus.

Many of the program's menus include an option that's indented two spaces, possibly with an asterisk beside it. These are options you can click on and off. The asterisk means the option is turned on.

The Main Menu

The main menu contains six options and four arrows. The latter are "scroll arrows" that you use to move the screen within the page buffer (see below). To observe these arrows in action, draw something on the screen. Here's how:

Activate the menu system by clicking on the Draw option in the main menu; then, when a submenu appears, click the Freehand option. Note that making a selection may make the menu disappear.

Now, position the pointer on the arrow pointing right and press the firebutton. This will make the contents of the screen seem to scroll left, because the screen is being moved to the right through the page buffer. Releasing the firebutton stops the scrolling and makes the main menu reappear. There are arrows corresponding to the other three directions also, but the up and down arrows are nonfunctional on the C-64 because of insufficient memory.

Following is an explanation of the functions accessed through each of the six main menu options.

The Pen Submenu

The two main drawing tools in RUN Paint are the pen and the brush, and the various options associated with them are controlled through the Pen submenu. There are six different pen styles, and an unlimited number of brush shapes and patterns are possible, since RUN Paint allows saving and loading of brushes and patterns. Brushes work by painting the part of the screen covered by the brush with the current pattern whenever the firebutton is pressed. Here's an example:

Activate the menu system, click on Pen, then move the pointer down to Use Brush and click on a brush for drawing. Next, move the cursor back onto the main menu and click on Draw, followed by Freehand. When you move the brush around while pressing the firebutton, the current brush pattern appears wherever the brush goes. RUN Paint lets you select from 11 different brushes and 35 different patterns at any one time.

Following are descriptions of the options in the Pen submenu:

Select Color lets you choose the color you want to draw with. When you click on a color, the border color changes to your choice to indicate the current drawing color.

Use Pen and **Use Brush**, which specify the pen or the brush for drawing, are mutually exclusive; if you select one, you deselect the other. An asterisk is always present beside the currently selected tool. The drawing modes in which you can select either pen or brush are Freehand, Lines, Rays, Spray, Ellipse and Box. Flood always uses the pen, regardless of which tool you've selected.

Affect Color. This option is either on or off. When it's off, none of RUN Paint's graphics commands affect color memory. If you want to use a Monochrome mode, just turn off Affect Color after activating the program.

Reflect On simultaneously creates up to three mirror images of an object as you're drawing it. Here's an example:

Enable the menu system, click on Pen, then on Set Reflect and on X in the Set Reflect submenu. Next, return to the Pen submenu and activate Reflect On. Now move back to the main menu and click on Draw, then on Freehand. As you move the pointer around while pressing the firebutton, you can verify that a mirror image is

The two main drawing tools are the pen and the brush.

drawn, reflected in the x-axis. Try the other options in the Set Reflect submenu, namely Y and XY. (See Set Reflect and Move Mirror, below.)

Set Reflect displays a submenu of reflection modes you can choose from when Reflect On is enabled. X produces reflection on the x-axis, Y on the y-axis and XY in the opposing quadrant. (Also see Reflect On, above, and Move Mirror, below.)

Move Mirror is the option you use to position the reflective x and y axes anywhere you want on the screen.

Select Pen lets you choose one of six pens for drawing when the Use Pen option is on. The first option draws normal solid lines and the second draws double-width solid lines. The third to sixth options produce one of four styles of dotted lines. In Freehand mode, only solid lines can be used. The dotted lines work only in the Lines and Rays modes.

Select Brush lets you choose a brush shape to use when Use Brush is on. Just click on a brush.

Select Pattern lets you choose a pattern when Use Brush is on. Just click on any pattern.

The Draw Submenu

The Draw submenu is used more frequently than any of the others, since it contains most of the commands for placing graphics on the screen.

Alter Color changes colors on the screen. You'd use it, for example, if you drew a flower with white petals and then decided it would look better in red. Selecting Alter Color brings up a submenu containing two options: **Card** and **Screen**. Card restricts the color change to a single card (see Technical Notes, below), which you select with the pointer. Screen makes the color change affect the entire screen. After selecting one of these options, a third submenu pops down from which to select the new color. In our example, you'd select red.

Once you select a color, the menus disappear, the border color changes to the color you selected and you're ready to initiate the color change. Position the tip of the pointer over the color you want to alter and press the firebutton. The border color changes to match the color of the pixel under the pointer. If this is indeed the color you wish to change, press the firebutton and the change takes place.

If nothing happens, you probably have the pointer positioned on a blank pixel. Move the pointer a little bit and try again. If the pointer is placed on the wrong color, you can abort the change by executing an Undo (see below) or by activating the menus, then moving the pointer off the menu back onto the screen to try again.

Wash lets you change the background color on a card-by-card basis in Hi-Res mode. When you select Wash, a menu pops down from which to choose the new color. After you select a color and the menus disappear, move the pointer onto a card and press the firebutton to change the background color of that card.

Flood fills an enclosed area with a solid color.

Here also, a menu pops down from which to select the color you want, and the menus disappear after you choose. Then position the pointer over the area you want to fill and press the firebutton. You can abort a fill in progress by executing an Undo (see below).

Freehand makes a freehand drawing. Pressing the firebutton while moving the pointer around draws a line. (See the Pen submenu, above.)

Lines is the option used for drawing straight lines. Position the pointer where you want a line to start and press the firebutton; then move the pointer to the line-end position and press and hold down the firebutton until the line is completely drawn. (See the Pen submenu, above.)

Rays draws lines that radiate from a common origin. Move the pointer to the desired starting point and press the firebutton; then move the pointer to a line-end position and press the firebutton again to draw the line. Draw additional lines by moving the pointer to new end positions and pressing the firebutton again. As in the Lines option, you must hold the firebutton down until the line is complete. (See the Pen submenu, above.)

Spray produces a spray effect. When you select this option, a submenu pops down with three additional choices—Light, Medium and Heavy—which specify the intensity of the spray effect.

Spray uses either the pen or the brush and works on a timer. In Heavy mode, it plots a point or paints a brush shape every $\frac{2}{60}$ of a second. The corresponding times for Medium and Light modes are $\frac{3}{60}$ and $\frac{15}{60}$ seconds, respectively.

If Use Brush is on, you can get an airbrush effect by selecting a brush consisting of a grid of dots. (See Select Brush, above.)

Eraser mode erases the screen card by card.

Edit lets you modify either a section of the screen, the brushes, the patterns or the current character font. Selecting Edit displays a submenu. To modify a section of the screen, click on Pixel Edit. After your selection, the menus vanish and the pointer appears, surrounded by a flashing box. Position the box over the part of the screen you want to edit and press the firebutton. This enlarges the screen inside the box, copies it to the bottom of the display, and then brings a color menu to the center of the display, from which you select a new drawing color. The top of the display shows an unmagnified section of the screen, so you can see the effect of your edits.

You edit pixels by positioning the pointer over them and pressing the firebutton. To erase a pixel, set the drawing color to the screen color. You can select a new area to edit by moving the pointer to the top of the screen and pressing the firebutton.

The Font, Brush and Pattern editing modes operate in a similar manner. After selecting one of them, the screen clears and the font, brushes or patterns are copied to the top of the screen. Select a character, brush or pattern for editing by clicking on it. The center of the screen shows a color bar containing two colors: blue and black. Select blue to erase pixels and black to set pixels. ▶



Paint
can load
standard
Commodore
character
sets.

You select a different character, brush or pattern to edit by moving the pointer into the top area of the screen and pressing the firebutton.

Ellipse uses either the pen or the brush to draw ellipses. Click twice to set two opposing corners of a box, and an ellipse will be drawn within the box. (See Solid, below.)

Box uses either the pen or the brush to draw boxes. Click twice to set two diametrically opposite corners, and a rectangle appears. (See Solid, below.)

Solid determines how Ellipse and Box work. When this option is on, ellipses and boxes are drawn filled-in. When it's off, they appear as outlines.

The Shape Submenu

The Shape submenu contains commands for cutting and pasting or erasing rectangular areas of the screen, along with whatever is within those areas. It uses a special area of memory called the "shape buffer," where shapes you cut or copy from the screen are stored. In Paste mode, the shape in the buffer is pasted on the screen. Note that it's impossible to paste a hi-res shape on a med-res (multicolor) screen, or vice-versa.



James Hastings-Trew produced this still-life picture using RUN Paint.

Cut duplicates a rectangular area and its contents from the screen to the shape buffer and erases it from the screen. Move the pointer to one corner of the shape and click, then to the opposite corner and click again.

Copy copies a shape on the screen into the shape buffer, but the shape remains on the screen. Execute this exactly as you would Cut.

Paste places a shape that's in the shape buffer onto the screen. In this mode, the pointer is surrounded by a box of the same size as the shape in the buffer. Move the box to where you want it located and click once. Note that it's

impossible to paste a hi-res shape on a med-res (multicolor) screen, or vice-versa.

Erase eliminates the contents of a rectangular portion of the screen. Move the pointer to one corner of the rectangle and click, then move it to define the opposite corner and click again.

Flip X. When this option is on, the shape is pasted and flipped horizontally about the y-axis.

Flip Y pastes the shape and flips it vertically about the x-axis.

RVS pastes the shape in reverse field. This option works well in Hi-Res, but not so well in Med-Res (Multicolor) mode.

Cover mode makes the shape completely cover the screen area where it's pasted. Normally, blank areas of the shape are not pasted.

The Type Submenu

The Type submenu is used to place text on the screen. Type is essentially monochrome and uses the current color.

Font. Clicking this option selects a new character font and enables Type mode. After you click, a submenu will appear offering an additional three options. The first corresponds to the RAM font, which RUN Paint can load in via the Load submenu (see Disk, below). If this option is blank, a font hasn't been loaded yet. RUN Paint can use either standard Commodore 8-bit character sets or special RUN Paint fonts, which are 16 bits wide and 16 high.

Graphics, the second Type option, selects the built-in ROM character set that consists of the uppercase alphabet and special graphics characters.

Text, the third option, selects the ROM character set containing the upper- and lowercase alphabets and business graphics characters.

After clicking on an option, you can begin typing. A flashing box shows where the next character will appear, and, when you press the firebutton, you can move this box anywhere you wish on the screen. Press the firebutton again after the box is positioned. The following are special features available while typing:

Cursor keys: Move the flashing box around.

Control/RVS On: A standard Commodore character set has 256 characters, numbered 0-255, but RUN Paint can use only 128 characters at a time. Simultaneously pressing the control and 9 keys selects characters 128-255 for typing.

Normally, characters 128-255 are just reversed images of characters 0-127, and Commodore uses them to provide a flashing cursor. RUN Paint doesn't need these reversed characters, so they can be replaced by another font, such as italics. This lets two 8-bit character sets reside in memory at once. RUN Paint provides no way to replace the reversed characters.

Control/RVS Off: Simultaneously pressing the control and 0 keys selects characters 0-127 for typing.

Home: Moves the typing box to the home position.

Return: Moves the typing box to the start of the next line.

DEL: Pressing the insert-delete key deletes the character to the left of the cursor.

Now, getting back to the Type submenu:

Width displays a submenu with three options: Normal, Double and Quadruple. Click on the character width you want.

Height also produces a choice of Normal, Double and Quadruple. Click on the height you want.

The next five options, affecting how text is placed on the screen, are mutually exclusive; only one can be activated at a time.

Cover, which is the Default mode, makes characters you place on the screen completely cover the area inside the typing box. In this mode, it's impossible for you to make a character blend in with the background.

RVS is similar to Cover, except that characters are reversed before being placed on the screen.

Or places characters on the screen using the logical Or operation, thus letting them blend in with the background.

And. When this option is selected, characters are placed on the screen using the logical And operation. To see how this works, paint the entire top of the screen with a pattern using a large brush, then select the Quadruple option and the And option on the Type submenu. Now choose one of the fonts, position the typing box on the pattern and begin typing.

XOr lets you place selected characters on the screen using the logical Exclusive-Or operation. This means the characters can blend in with the background.

The Disk Submenu

The Disk submenu is used to save and load files to disk, as well as to issue disk commands and select the disk device number. RUN Paint filenames must not contain any spaces.

Load. This option on the Disk submenu can load a number of types of files, which are selected from a submenu. After you select a file type, RUN Paint displays a list of the files of that type available on the disk. Just move the pointer onto the filename you want and press the firebutton.

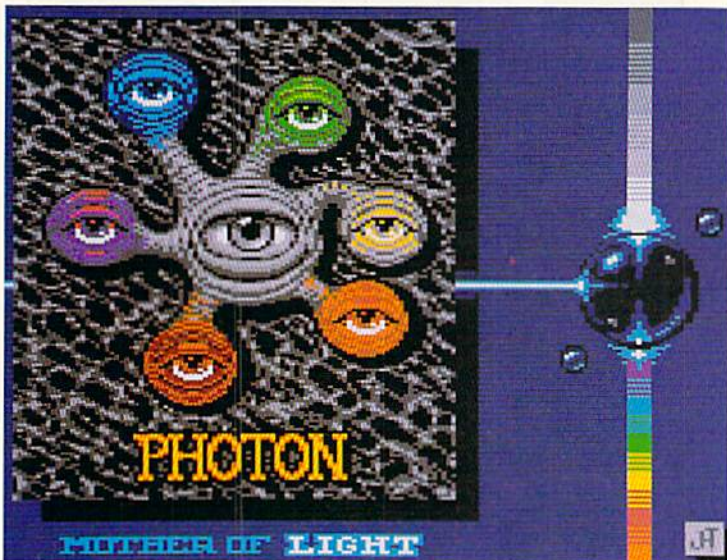
RUN Paint can load standard Commodore character sets, as well as files created with other programs, such as Koala Painter, Doodle! and Flexidraw. These files must be renamed to conform with RUN Paint format. (See Load Font, Monochrome, Hi-Res Screen and Med-Res Screen, below.)

Use the **Font** option in the Load submenu to load a font. As mentioned above, RUN Paint can use standard Commodore character sets. However, the file must be renamed according to RUN Paint format before the program can load them. All RUN Paint font filenames must begin with the letters RPF and a period. For example, a character set named ITALICS would have to be renamed RPF.ITALICS. Remember, no spaces are allowed in a filename.

The **Page** option loads an entire page, **Shape** loads a shape, **Patterns** loads a set of patterns and **Brushes** loads a set of brushes.

Monochrome provides a way to load a straight 8K monochrome bit map with no color. Flexidraw saves pictures in this format. Before you can load a Flexidraw picture into RUN Paint, you must rename it. For example, a Flexidraw file named JAGUAR would have to be renamed RPO.JAGUAR. Once again, there can't be any spaces in the filename.

After loading a monochrome bitmap, RUN Paint enters a special mode where you can copy a section of the screen to the shape buffer. If you go to a menu, the screen is copied to the page buffer. If you perform an Undo, the screen will go back to what it was before loading. ▶



Photon-eye, created with RUN Paint by James Hastings-Trew.



Glass and coaster, by James Hastings-Trew.

The Mode submenu is a catch-all for commands that don't fit in anywhere else.

Hi-Res Screen loads high-resolution screens that include color, such as Doodle! picture files. As with Flexidraw files, Doodle! files must be renamed to RUN Paint format before they can be loaded. A Doodle! file named DD.FIELD would be renamed RPH.FIELD.

Also as with Flexidraw files, after loading, RUN Paint enters a special mode enabling you to copy a section of the screen to the shape buffer. If you go to a menu, the screen is copied to the page buffer, and performing an Undo restores the screen as it was before loading.

Med-Res Screen loads medium-resolution (multicolor) screens, such as Koala picture files. Like the other file types I've mentioned, Koala files must be renamed according to RUN Paint format before they can be loaded. A Koala file named APICA.FIELD would be renamed RPM.FIELD.

As with the previous two commands, RUN Paint enters a special mode where you can copy a section of the screen to the shape buffer. Going to a menu copies the screen to the page buffer, and an Undo restores the screen as it was before loading.

The **Utility** option enables RUN Paint to load in and execute user-defined, machine language utility programs that can give RUN Paint more capabilities. The programs must be assembled to run at address \$6C00, and their filenames must begin with the letters RPU and a period.

Save. This option on the Disk submenu displays a further submenu from which various types of files can be saved. After selecting a file type, enter the desired filename, omitting a prefix, since RUN Paint will install it automatically. For example, if you enter ITALICS as the name of a font, RUN Paint will save it as RPF.ITALICS. As before, don't include any spaces in the filename.

There are eight commands for saving files, representing eight different file types. **Font**, **Page**, **Shape**, **Patterns** and **Brushes** are self-explanatory. **Monochrome** saves the contents of the screen as a straight 8K monochrome bit map with no color. **Hi-Res Screen** saves the contents of the screen as a Doodle!-compatible file. **Med-Res Screen** saves the screen as a Koala-compatible file. After you enter the filename for a med-res screen, the text screen will fill with strange colors. Don't worry. This is just because the text screen and the med-res screen share the same color memory.

Other Disk submenu options are:

Command. Select this option from the Disk submenu to issue a command to the disk drive for formatting a disk or scratching or renaming a file.

Set Device lets you specify device 8 or 9 for saving and loading.

The Mode Submenu

The Mode submenu is a catch-all for commands that don't fit in anywhere else. It lets you set the screen and pointer color, print, select high or medium resolution, and more.

Cursor. This Mode submenu option displays

a further submenu that offers three options: Solid, Flash and Card Restricted. **Flash**, the default, produces a flashing cursor. With **Solid**, you get a nonblinking cursor. You must also select the cursor color from a submenu. **Card Restricted** restricts cursor movement to coordinates that coincide with the upper-left corner of a card. This is often useful in Type mode and when pasting shapes.

Screen Color displays a submenu from which to alter the screen color. The color is actually changed for the entire page, not just the screen, and on the C-128 this takes a second or two. The change isn't finalized until the cursor is moved off the Screen Color submenu.

GoTo. This Mode submenu option lets you move around the page buffer quickly. On the C-64, three options are available in this submenu: Left, Middle and Right. On the C-128, you have an additional four options: Top, Bottom, Screen Up and Screen Down. As mentioned above, the page buffer is wider than the screen. In fact, it's 80 cards wide. Clicking on **Left** brings columns 0-39 of the page buffer to the screen. **Middle** and **Right** display columns 20-59 and 40-79, respectively. Clicking on **Top** moves the screen to the very top of the page buffer on the C-128. **Bottom** moves the screen to the bottom of the page buffer. **Screen Up** and **Screen Down** move up and down through the page buffer approximately half a screen at a time.

Clear Screen. This option in the Mode submenu predictably clears the screen. This action can be reversed with an Undo command.

Clear Page clears the entire page and cannot be undone.

Print. Various printout options are accessed through this submenu. They let you print part or all of a screen or page.

Screen prints just what is currently displayed. If the Define option (see below) is on, you can specify the number of screen lines to print. If Define is off, the full screen is printed.

Page prints the page buffer. Similar to printing a screen, if the Define option is on, you can specify the number of lines to print from the page. If Define is off, the full page is printed.

Rectangle defines a rectangular area of the screen to be printed. This area can be as large or as small as necessary. After the menus disappear, click once to define one corner of the rectangle, then move the pointer to define the diametrically opposite corner and click again to start printing. Rectangle doesn't work with the Prowriter printer.

RVS. If this is set to on, the printout will be in reverse field.

Disk. When Disk is on, the printer output will be sent to the disk. You must enter a disk filename before printing begins.

Define works with Screen and Page, but not Rectangle. As mentioned above, this option lets you define the number of lines to print from the screen. After you choose to print a screen, the menus disappear and a horizontal line appears. Move the line to define the bottom of the part

of the screen you want printed and press the firebutton. The screen will be printed from the top down to the line.

You can also define the bottom line when you print a page, but printing takes place from the top of the page buffer down to the line. You can use ScreenUp and ScreenDown to position the screen in any part of the page buffer on the C-128.

Click on **Select Printer** to tell RUN Paint what type of printer you have. The program supports three printers and their compatibles: the Commodore 1515, the Epson and the C.Itoh Pro-writer. If you have one of the printer interfaces that offer 1515 emulation, you should be able to use the 1515 printer driver, regardless of the type of printer you own.

Click twice on **Quit** to leave RUN Paint and return to Basic. On the second click, press the button for at least a second.

Use the **Device** option to tell RUN Paint whether you're using a joystick or a mouse.

Hi-Res and **Med-Res** specify either High Resolution or Medium Resolution mode. These options are mutually exclusive; selecting one unselects the other.

The Undo Feature

I'll wrap things up with a look at RUN Paint's most useful feature: Undo. Undo is not selected through the menu system, so I'll illustrate it with an example. Draw something on the screen, then activate Undo by moving the pointer five pixels below the bottom border of the screen (as far down as it will go) and pressing the firebutton. The screen will clear, "undoing" the last function performed.

Each time you access the menus, the screen's contents are copied to the page buffer, and Undo


works by copying the page buffer back to the screen. This means you can reverse any action performed since the last time the menus were accessed.

Technical Notes

The VIC chip in the C-64 and C-128 organizes the graphics screen into little rectangles called "cards." The screen contains 25 rows of cards, with 40 cards per row. In Hi-Res mode, each card contains eight pixels horizontally and eight pixels vertically, and only two colors are possible per card: a foreground color and a background, or screen, color. If you try to add a third color to a card, the foreground color will change to the new color.

In Med-Res mode, also called Multicolor mode, three different foreground colors are possible per card, and the background color is the same for all cards. The luxury of having three foreground colors is paid for by decreased screen resolution. The pixels are twice as wide as in Hi-Res mode, and a card contains only four pixels horizontally by eight vertically.

The Page Buffer

RUN Paint uses the screen as a window atop a larger area, referred to as the "page buffer." On the C-64, RUN Paint can handle drawings up to 640 pixels wide and 200 pixels high. With its larger memory, the C-128 can handle a full 8½×11-inch page, allowing drawings of up to 640×792 pixels. 

Robert Rockefeller is probably best known to RUN readers as the creator of our fine word processing program, RUN Script, for both the 64 and 128.

Listing 1. Create RUN Paint boot program. (Note: RUN Paint's listings are available on the RUN Works and March-April ReRUN disks.)

```

0 REM CREATE RUNPAINT BOOT PROG      AS,(20)+RIGHT$(AS,(LEN(AS)-21 103 DATA 821C1E008B2041B23020 A
RAM                                  ):GOTO 70                          :REM*137      72041B2313A20932230 3A53595
5 OPEN 8,8,8,"RUNPAINT BOOT,P,W     65 B$=LEFT$(AS,20)+MID$(AS,22,2 32E5354554646      :REM*195
"                                     )+RIGHT$(AS,LEN(AS)-42)      104 DATA 2E48222C382C313A208F 2
10 READ AS:IF AS="-1" THEN CLOS      :REM*140      04C4F41442048495245 5320425
E8:END                                :REM*78      70 FOR I=1 TO LEN(B$)/2:REM*221 255534845532C      :REM*168
15 IF LEN(AS)<62 THEN 55              75 C$=MID$(B$,(I*2)-1,2):H$=LEF 105 DATA 205041545445524E532E 0
                                     :REM*254      T$(C$,1):L$=RIGHT$(C$,1)      0A61C2800433634B2AB 313A208
20 B$=MID$(AS,1,20)+MID$(AS,22,     :REM*140      B20C228363535      :REM*177
20)+MID$(AS,43,20)                  :REM*242      80 H=VAL(H$):IF H$>"9" THEN H=A 106 DATA 333229B3B132323620A7 2
25 FOR I=1 TO 30                      :REM*181      SC(H$)-55                          :REM*56      0433634B23000B51C32 008B204
30 C$=MID$(B$,(I*2)-1,2):H$=LEF     85 L=VAL(L$):IF L$>"9" THEN L=A 85 L=VAL(L$):IF L$>"9" THEN L=A 107 DATA 3000EC1C3C008B20CC28 2
T$(C$,1):L$=RIGHT$(C$,1)           :REM*84      E29B23520A720992293 111122C
                                     :REM*209      90 BY=H*16+L:PRINT#8,CHR$(BY);    :REM*148      7283135292245      :REM*157
35 H=VAL(H$):IF H$>"9" THEN H=A     :REM*85      95 NEXT:GOTO 10                      :REM*160      108 DATA 4E41424C452034302043 4
SC(H$)-55                             :REM*85      100 REM HEX DATA FOR RUNPAINT B 100 REM HEX DATA FOR RUNPAINT B
40 L=VAL(L$):IF L$>"9" THEN L=A     :REM*136      ASIC BOOT PROGRAM :REM*65      F4C554D4E204D4F4E49 544F522
SC(L$)-55                             :REM*136      101 DATA 011C191C0A008F204453 4 109 DATA 00DE20303A2097203235 3
45 BY=H*16+L:PRINT#8,CHR$(BY);      :REM*67      15645224052554E2050 41494E5 6342C3139323A209720 3231362
                                     :REM*115      422003B1C14000      :REM*116      C3235353A20FE      :REM*18
50 NEXT:GOTO 10                      :REM*115      102 DATA 8F20424F4F542050524F 4 110 DATA 0220313353A20FE11224F 4
55 IF LEN(AS)<21 THEN B$=AS:GOT     :REM*184      752414D20464F522052 554E205 22E424F4F5420525022 2C5028D
O 70                                    :REM*184      041494E542E00      :REM*160      1282230433030      :REM*231
60 IF LEN(AS)<42 THEN B$=LEFT$(

```

Continued on p. 69.

RUN Paint Primer

◆

*To create a graphics masterpiece,
you need a quality program
(RUN Paint) and these hints
from a professional computer artist.*

◆



RUN Paint (see previous article) for the C-64 and 128 is an easy-to-use and versatile art program, and, like all powerful utilities, it responds well to a little advance planning. As a professional computer artist, I'm always amazed at the impact, in time and results, that some careful forethought can have on a project. It can mean the difference between "just another computer picture" and that eye-grabbing display I've been striving to create.

GETTING STARTED

Unlike many commercial draw and paint programs, RUN Paint offers the computer artist a choice of screen modes: High-Resolution (HIRES) mode, which produces the crispest screen images but severely limits the way you can apply color, and Multicolor (MEDRES) mode, which compromises the screen resolution but offers much more latitude in handling color.

Your choice will depend largely on your art experience and whether the image you plan to create is intended to appear on the screen or on paper. Since I came to computer art from a traditional

oil background, Multicolor is the mode I almost always use.

Once you've set the Screen mode, it's time to select the background color for your piece, making sure that it complements the intended image. Some people pick the color that will cover the largest area in the picture; for instance, blue for a landscape with lots of sky. However, this is usually a mistake.

Instead, consider using a color that will be distributed evenly over the picture. Black is a great choice, as you'll almost always be using black to delineate objects, shade colors, and so on. White would be appropriate where you want to place a lot of highlights on objects for shiny effects. Dark or medium gray is good if you want a lot of muted colors. The choice of background color is a crucial one, because it will directly affect the ease with which your picture comes together.

CREATING A FRAMEWORK

RUN Paint's unique virtual-page feature is a great tool for composing a picture, and it provides room to maneuver in case you paint yourself into ►

By JAMES HASTINGS-TREW

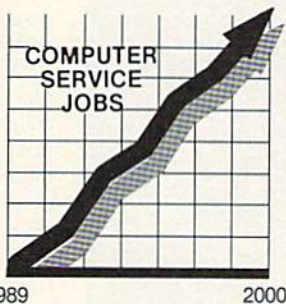
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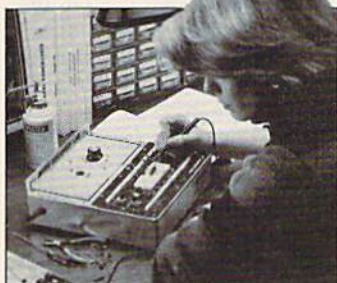
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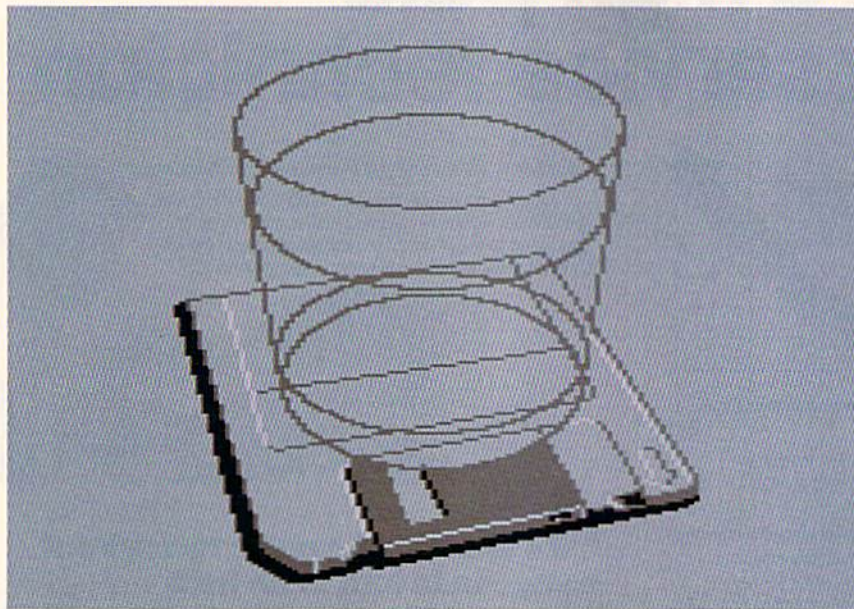


Figure 1. Example of a layout sketch.

a corner. I always move into the virtual-page area when I start a new picture; all it takes is a few presses on the down- and right-arrow keys.

Composition is to a picture as the framework is to a house: If the framework isn't sound, the house will never be right. Normally, you should lay out the entire composition of a computer painting before you begin to apply color, working out all perspective problems and object placements in the process. (See Figure 1 for an example of a layout sketch.)

Pick a simple color, such as dark gray; then, with the line tool, rough in the outlines. You can also use the ellipse and freehand tools to rough in shapes. Working with outlines, it's easy to correct layout mistakes, without ruining hours of work, by using a large brush shape in the background color.

If you find that you've placed your picture too high, too low, or too far to the left or right, use the arrow keys to

move your window on the virtual page. This capability can save lots of work when you want to get an image positioned "just so."

Try to resist the temptation to "get in there" and start adding details at this point. Remember, you're creating the framework for your picture, so the screen should be uncluttered to make major changes easy. You need to be free to try out different ideas without worrying about spoiling hours of work. Keep the "precious" work until the end, when the framework is all but graven in stone and most of the colors and blendings are set.

BLENDING AND SHADING

Once you get the framework of your image together, it's time to color it in. If you're using Multicolor mode, this means first getting to know the color restrictions of that mode and the peculiar way it makes the colors interact on the screen. In this mode, you can

have only four colors in any "place" on the screen at one time; if you try to add a fifth, one of the first four will change and several pixels may suddenly pop to the new color. I usually ignore color restrictions when I'm creating and deal with them only when necessary.

Of the four colors you can have in any place, one is always the background color. This means, for all intents and purposes, that when you're shading or blending, you'll be dealing with only three colors. A few combinations of the 16 colors in your Commodore palette provide blended effects that are especially nice.

To blend colors with RUN Paint, you can use a Zoom-mode technique called "dithering," which alternates two or more colors in a checkerboard pattern. When viewed on the screen, the colors will appear to blend into an in-between color. Bear in mind, though, that there is a price to pay with dithering. It lends a texture to the areas where it's used. A kind of clothlike softness is often the feel of a dithered area, so you should use it minimally when you're creating images of hard, shiny or rough surfaces. Figure 2 shows two images shaded with the same colors, but notice the textured effect that dithering has created in the image on the left.

There are several main groups of colors to keep in mind when blending and shading:

Black, dark gray, medium gray, light gray and white all fit into an excellent gray scale, which, when used properly, can produce very smooth blending effects.

Blue, light blue and cyan make a fairly short scale of blue values. However, you can create good in-between shades by dithering with one of the gray values. In a pinch, a very dark blue can be achieved by dithering dark blue with black, but the resulting area will have a definite texture.

Brown, red, orange and light red constitute a good scale of red colors. Highlights can be created in this scale with light gray or white, while dark and medium gray will produce shadow effects and muted shades. Yellow sometimes works with the red values as a highlight color and is a good way to get a better orange value. Light red and light or medium gray work well as flesh tones and combine into some smooth colors.

Green and light green are the only values in their very short scale. However, they work extremely well with all the grays, plus light blue and cyan, to create a wide and subtle range of colors

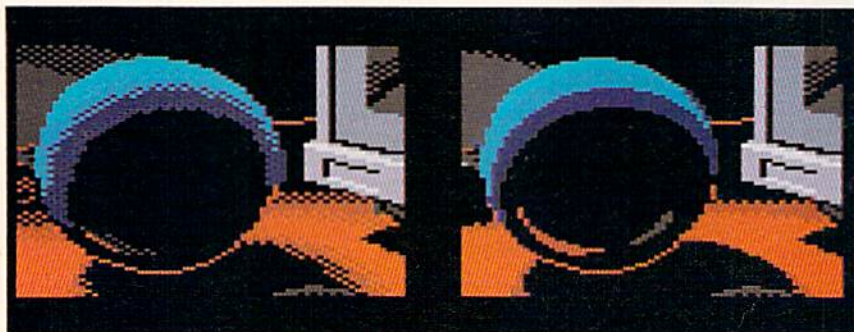


Figure 2. Example of the textured effect resulting from "dithering." The image on the left is dithered.

that show minimal texturing on the screen.

Purple seems to stand alone, but you can get surprising results by dithering purple with the gray colors. Purple and light red or light blue also yield interesting results.

Yellow, like purple, is a loner. A good light yellow can be achieved by dithering yellow with light gray or white.

BUILDING YOUR PICTURE

In traditional oil painting, the artist often works from the background of the picture to the foreground, washing in the sky, clouds, hills and trees before painting in the people, horses and buildings. This makes sense when you're laying real paint down on a real surface, with later work lying on top of earlier work. In computer art you have a two-dimensional surface, and it makes more sense to render foreground objects first and then rough in the background. After all, you're most interested in the foreground objects, so, if you're going

to have problems fitting in colors, you'd do better to make compromises in the background. Also, if you fill the background in first, you may find yourself fighting with those colors in order to do justice to your subject matter.

to have problems fitting in colors, you'd do better to make compromises in the background. Also, if you fill the background in first, you may find yourself fighting with those colors in order to do justice to your subject matter.

PATTERNS AND TEXT

The pattern and text capabilities of RUN Paint work best in Hi-Res mode. When you're filling in a background with a repeating pattern, you'll get the most satisfying results by creating a small patch of pattern in Zoom mode and then using the Copy and Paste commands under the Shape menu. For text I also work in Zoom mode, which lets me create really nice letters.

Another trick in the computer artist's bag is anti-aliasing, a Zoom-mode tech-

nique for smoothing out the rough edges that the relatively coarse Multicolor-mode pixels can have, particularly on diagonal lines and curves. In anti-aliasing, you blend out the stairsteps of the edges by using colors with values between those of the object and its background. This technique works well with drawing text; just a pixel in an intermediate color at the corners of letters can really smooth out the curves and lines.

See Figure 3 for an example of a raw line and an anti-aliased version of the same line.

THE LONG VIEW

The best way to get a good look at a work in progress is to occasionally get your face out of the monitor, rise from your chair and walk several feet away. You might turn your head upside-down, too; that's a great way to discover a flaw that you've grown used to seeing. If you don't get up and away from the monitor from time to time, you may end up with a picture that suffers from lack of con-

trast, poor composition, bad color balance or other deficiencies.

I also ask the opinions of other people when I'm near the end of a project. They often come up with surprisingly helpful ideas to tweak a good image into a fantastic one. A combination of these techniques helped me put together the images included with the RUN Paint article and on the magazine cover.

One of the best ways to learn new techniques for color blending, composition and anti-aliasing is to inspect images by professional computer artists. This is especially effective in Zoom mode, where the pixel magic is readily apparent.

I really enjoy computer art, and I hope the tips I've offered here will inspire your creativity, too. Just think, with your Commodore and RUN Paint, you may become a "digital da Vinci." ■

Canadian James Hastings-Trew is a professional graphics designer whose pictures and utility programs are well-known to users of the Graphics SIG on QuantumLink.

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5A

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Many Happy Returns

Make tax-time as painless as possible with your Commodore and one of these tax-preparation programs.

By SANDRA COOK JEROME

Doing your income taxes after the Tax Reform Act of 1986 can be a long and tedious task, but now there's help for those who are overwhelmed with the complexity of the forms and schedules. This article reviews four Commodore-compatible tax programs available today, at least one of which should be suitable for your tax situation.

Each of the programs has features that are unique. Two are for the C-64 only, while the other two come in both C-64 and C-128 versions. Refer to Table 1 for a summary of program features and Table 2 for the manufacturers' addresses.

SWIFTAX

Swiftax, from Timeworks, is an easy-to-use program that's suitable for a simple tax return. It features pull-down menus, help screens and a pop-up calculator. You enter your wages, deductions and credits in any order, easily changing from one form to the next. Then, when all your information is in, it's ready to print directly on IRS forms or blank paper.

Swiftax has four pull-down menus: File, Print, Forms and Schedules. You use the File menu to change the general configuration, get an overview of 1988 changes, update the file and quit. The Print option lets you change the printer configuration.

The Forms and Schedules menus let you input most of your tax information. The first option in the Forms section is for entering taxpayer information such as filing status, address, number of children and wages. Next, you select specific forms or schedules to work on. If information is needed from another form (for example, adjusted gross income is needed from Form 1040 to complete computations in Schedule A), the program just skips that line. This is a

nice feature, since without years of tax training, it's difficult to know which forms or schedules should be completed first. Because it calculates the tax, you can use Swiftax for tax planning or estimating, although some schedules or forms might be incomplete or missing.

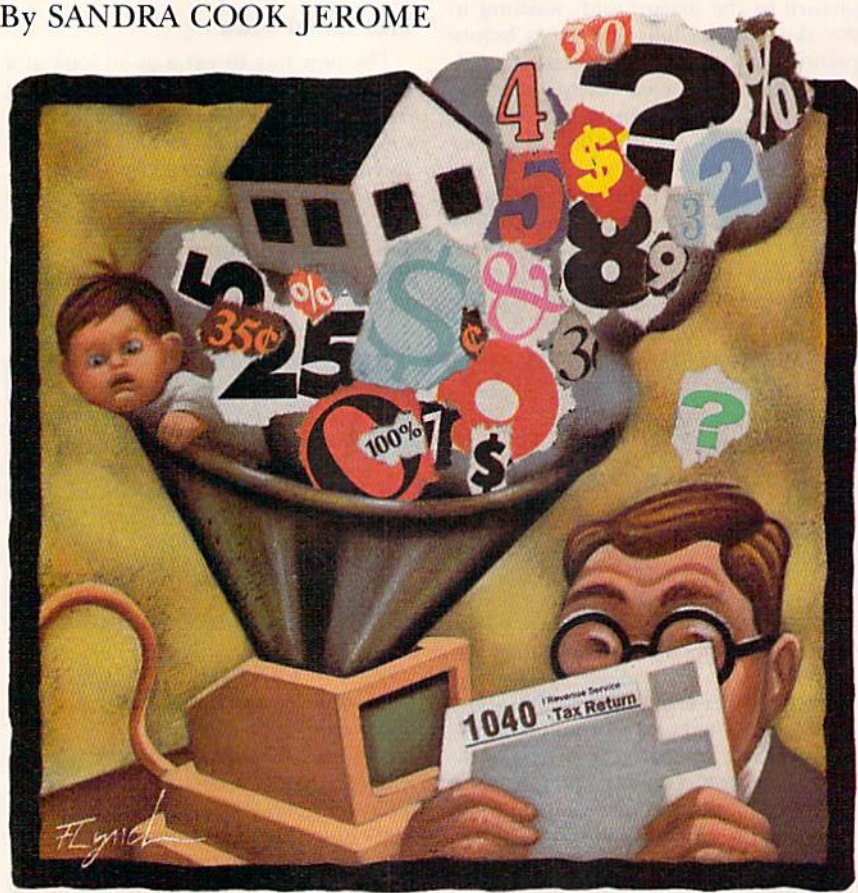
Throughout the program, pop-up help and instruction screens appear when you press the Commodore and H keys simultaneously, and the function keys let you move from page to page, from top to bottom of the form, and back and forth between fields.

A nice improvement in the latest version of Swiftax is the built-in "fast-load" utility, which enables the program to

load in 17 seconds, compared with over two minutes for the 1987 version.

The user's guide introduces the main functions of the program and contains a helpful chapter on simple steps to filing your tax return. It's not only an instruction manual, but a great tax guide as well.

Swiftax is not appropriate to the professional tax preparer, since it lacks important forms and schedules, such as Form 2119 (Sale of a Personal Residence) and Schedule E (Supplemental Income Schedule from Rents, Royalties and Partnerships). However, it is a worthwhile investment for preparing simpler tax returns or doing some tax planning. It's ▶



RUN Works: A One-Disk Software System for Everything Commodore 64 and 128 Users Need

1. **RUN PAINT** Full-Feature Paint and Drawing Program
2. **MONEY MANAGER** for Business and Home
3. **LABEL BASE** Create Address Labels
4. **RUN TERM** Telecommunicator
5. **RUN SHELL** Disk Utility
6. **GRAPHMAKER** 3-D Bar Graphs
7. **FORM WRITER** Forms Design

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RUN WORKS.

As a home-based business owner, I save time and money with LABEL BASE's fast, easy address labeling system. And I really appreciate FORMWRITER'S form creation program when I think of the money I'd spend creating and printing forms professionally.

When I create a proposal for work, GRAPHMAKER'S 3-D Bar Graphs really help me make my point.

The MONEY MANAGER really lets our family plan our finances and save!

I think RUNPAINT is awesome 'cause I can draw on the screen just by moving the pointer with my joystick or mouse. It's easy!

RUNPAINT lets me design and print my own unique creations. Even though I'm not an artist, RUNPAINT makes me look like one!

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HAPPY RETURNS



Swifttax form selection menu.

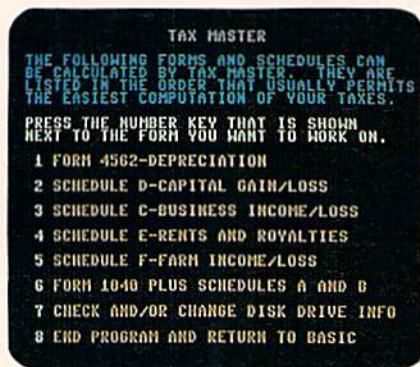
definitely easy to use and a reflection of Timeworks' commitment to quality in personal computer software.

TAX MASTER

Master Software's Tax Master is a functional, menu-driven tool that's designed to both store data from many different returns on the same disk and create multiple schedules for taxpayers with one or more businesses.

The program lists forms and schedules in an order that makes completing a return easy, starting with a depreciation form that contains information needed for the business income or loss schedule. However, the forms and schedules can also be completed in any order you desire. For example, if the only information you have at the time is your wages and mortgage interest paid, you can skip to the last selection, Form 1040 and Schedules A and B, and enter that information. The tax is instantly calculated, and the results can be viewed on the screen or printed on blank paper.

The remaining optional forms and schedules are Schedule D, Capital Gain/Loss; Schedule C, Business Income/Loss; and Schedule F, Farm Income/Loss. Each of these schedules has its own main menu with options to enter data from the keyboard, enter data



Tax Master forms and schedules.

from another disk, store the data, make corrections, print the data and display the data. Since this menu is included for each schedule and form, it's easy to complete all 1040s for your family or your clients and print them without changing disks or programs.

Unfortunately, Tax Master does not print directly on IRS forms and lacks some of the most important forms—such as 2106, 2441, and 3903—needed by the professional tax preparer. I also wouldn't recommend it for preparing your own taxes for the first time, since there's little tax help. However, for the budget-minded person with experience doing taxes or a professional preparer who just wants to double-check the major schedules, Tax Master is a bargain.

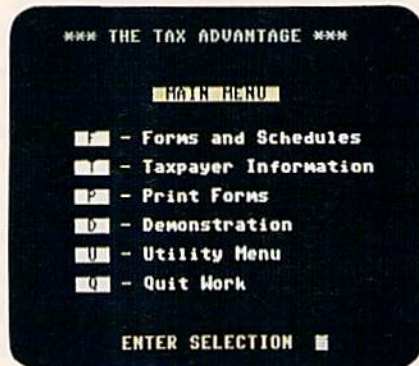
THE TAX ADVANTAGE

The Tax Advantage, from Double Eagle Software, is a complete and easy-to-use program with a main menu that contains six options: Forms and Schedules, Taxpayer Information, Print Forms, Demonstration, Utility Menu and Quit. The Demonstration option, which is highly recommended in the user's manual, is indeed surprisingly informative. Most users familiar with taxes could toss the manual away after sitting through this demonstration.

Following the demo, the program forces you into the Utility option to configure your hardware and initialize a data disk. When you're done initializing the data disk, the program takes you directly to the Taxpayer Information section to enter personal information and your filing status and exemptions.

The Forms and Schedules options include Forms 1040, 2106, 2441 and 6251, and Schedules A, B, C, D, E, F and SE. The entry screen for these forms and schedules is unique to this program. You can jump to any line on a form or schedule with the Line option, and use the function keys to move forward or reverse a screen or line. Also, you can itemize any line. For instance, rather than entering a total for Other Taxes, you can choose to itemize the line and enter the descriptions and amounts. Then the program totals the items and enters the total on the original line. If you want to add only amounts on a line, without descriptions, just enter the dollar amount and press the plus key. At any time, you can select the Help function for tax tips, such as including personal property taxes on the Other Taxes line.

The program automatically recalculates totals, and the tax can be computed anywhere on Form 1040. The new tax,



Tax Advantage 64 main menu.

the overpayment and your tax bracket are displayed at the bottom of the screen.

The Print option lets you print all the forms continuously or any form individually, and, within each form, you can print on plain paper or IRS forms. You can also print any item or line of items on a form and change the printer setup without returning to the Utility option.

The Tax Advantage offers two tax planning features. By pressing the control and X keys simultaneously, you can override the amount entered on a line with an estimate for next year, and selecting the Option function you can activate an override to quickly determine the tax consequences of a year-end tax decision.

Most features are identical between the C-128 and C-64 versions of the program, and the data disk is interchangeable between them. The user's manual is complete and includes a reference guide and printer code appendix.

The only problem I found with this program is the long loading time for each form and schedule and the need to swap between data and program disks. All in all, The Tax Advantage is ideal if you want a complete and efficient program. It may require a little more time for entering information than other programs, but its options



Tax Advantage 128 screen display.

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and features can be worth it, especially if you need forms not included in other tax packages.

TAX COMMAND PROFESSIONAL

Practical Programs offers two tax programs: Tax Command Professional and Tax Command Planner. Their tax-preparation program, Tax Command Professional, contains more forms and schedules than the other programs I've reviewed here. In fact, it's generally a more professional program, combining completeness and speed.

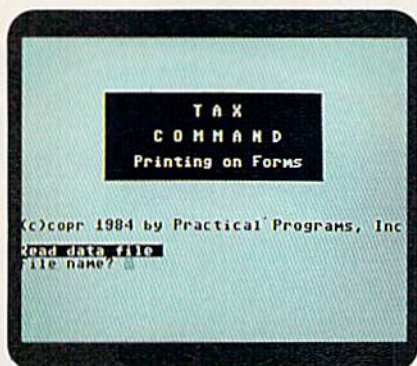
It'll probably take you a few minutes to figure out how to enter information at the opening screen. Your options are to enter your filing status, your exemptions, or other schedule and IRS line-number information. It's also possible to save to the disk, print or quit from this screen.

By pressing the cursor-down key at the opening screen, you can display each line of Form 1040. Then you can select any line, and place information directly into lines that collect information from another schedule or form or switch to the appropriate form or schedule. While you're entering information, the built-in calculator will simplify totaling items.

The program switches quickly between forms and schedules without going back to the disk drive, doesn't force you to save data and makes subtotal and tax calculations automatically.



Tax Command Professional screen display.



Tax Command Planner screen display.

The Print function works with both blank paper and IRS forms, and it will produce more than one schedule at a time.

The Tax Command Professional manual is basically a reference guide,

with very little tax help. It does provide a relatively simple example to follow, but if this is your first time doing your own taxes, I'd recommend buying a tax guide for assistance.

This program is suited to the professional preparer for completing most returns and quickly checking previously prepared returns. It can't print multiples of Schedule C or SE, or Form 2106, but makes up for that in speed.

Practical Programs' Tax Command Planner, while not a tax-preparation program, can be useful for computing various types of depreciation and comparing income and deductions at different tax rates. It can also calculate the present value of future taxes, predict taxes based on a percentage of increased income and figure your marginal tax rate. I would recommend this program if you just want to see an estimate of your refund before turning your records over to your preparer. Tax Command Planner can be used from year to year, as long as you get the updates from Practical Programs. ■

Editor's note: Another Commodore-compatible tax program we've heard about but have not yet seen is Taxaid, from Taxaid Software, 606 Second Ave., Two Harbors, MN 55616. Available in 64 and 128 versions. The price is \$49.95, with yearly updates for \$18.

Sandra Cook Jerome is a Certified Public Accountant, small-business computer consultant and book and magazine author on business computer topics.

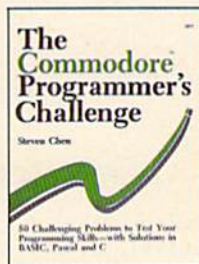
Table 1. Features of Commodore-compatible tax programs.

Feature	Swiftax	Tax Command	Tax Master	Tax Advantage
Price	\$49.95	\$49.95	\$32	\$49.95
Form 1040	x	x	x	x
Forms 1040A, 1040EZ	x			
Schedules:				
A	x	x	x	x
B	x	x	x	x
C	x	x	x	x
D	x	x	x	x
E		x	x	x
F	x		x	x
R		x		
SE	x	x		x
2106	x	x		x
2119		x		
4562			x	x
6251				x
8615	x	x		
2441	x	x		x
3903		x		
Prints on IRS forms	x	x		x
128 mode		x		x
1989 update	half-price	half-price	discount	discount

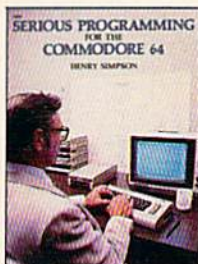
Table 2. Manufacturers' addresses.

Swiftax Timeworks, Inc. 444 Lake Cook Rd. Deerfield, IL 60015
Tax Command Professional Tax Command Planner Practical Programs, Inc. PO Box 93104 Milwaukee, WI 53203
Tax Master Master Software 6 Hillery Court Randallstown, MD 21133
The Tax Advantage Double Eagle Software, Inc. 2210 Wilshire Blvd. Suite 875 Santa Monica, CA 90403

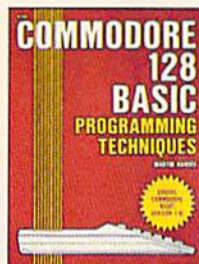
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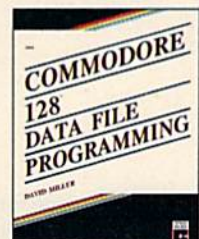
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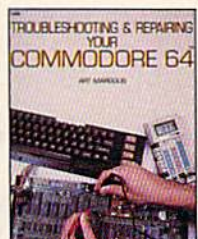
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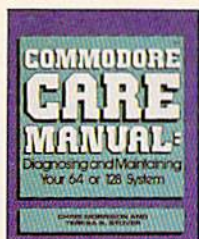
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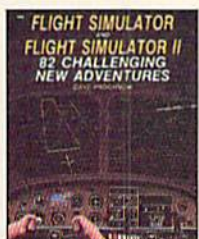
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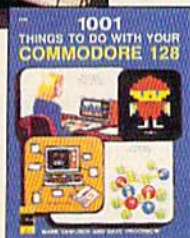
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Kalah

Are your wits sharp enough to win at this centuries-old board game?



By MICHAEL BROUSSARD

Kalah, written completely in Basic for the C-64 or 128 (in 40-Column mode), is a game of strategy based on a popular African pastime that involves moving counters, usually pebbles, among 14 pits dug in the ground. To play the game, first type in the program in Listing 1, and save it to disk before running it. The computer is your opponent.

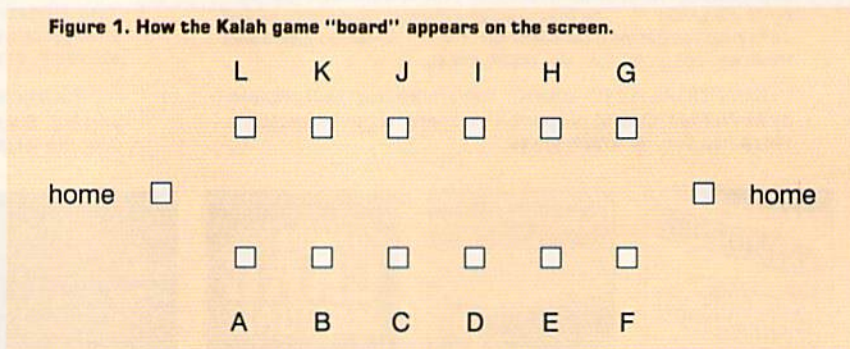
When you type RUN, Kalah clears the screen and asks you to declare the skill level you want: Beginner, Intermediate or Expert. To make your choice, type 1, 2 or 3, respectively, and press the return key. Try level 1, Beginner, for your first game. Later, I'll touch on how Kalah varies its strategy according to the skill level chosen.

Next, Kalah prompts you to enter the number of counters (called "stones") that you want in each pit to begin with. Pressing the return key chooses the default number, which is 3. (You may actually specify any number from 1 to 6, but more about this later.) After you make your choice, the screen clears again and shows the game "board," which consists of 14 squares, representing the pits of the original game. (See Figure 1.)

Each pit displays a value that indicates the number of stones it currently contains. If no value is shown, that pit is "empty." The six pits in a row at the bottom of the board—labeled A through F—are under your control. The six above—labeled G through L—are controlled by the computer. The pit at the right end of the two rows is your "home pit"; the one at the far left is the computer's. The object of the game is to accumulate more stones in your home pit than the computer does in its.

HOW TO PLAY

The computer randomly decides who



will play first. In the physical game, you would play by removing all the stones from one of your pits and redistributing them, one at a time, to adjacent pits in a counter-clockwise fashion, skipping no pits *except* the home pit of your opponent. In the computer game, the principle is the same, but the machine does the moving for you.

To choose a pit to play from when it is your turn, simply type the letter (A through F) of the one you want and press return. (Use the delete key if you change your mind or make a mistake.) When you make your selection and press return, the numbers in the squares on the screen change to reflect the new situation. The computer's play is similar, except it chooses from pits G through L and skips *your* home pit.

For example, if your move selection is A, the three stones are removed from that pit and deposited in pits B, C and D. When you've completed the move, pit A is empty and pits B, C and D each contain 4 stones. This ends your turn. If your first move is from pit E, the three stones end up in pit F, your home pit and the computer's pit G. As another example, if a play is from pit E, and it already contains ten stones, the ten would be "sown" into pits F, your home pit, pits G through L, and pits A and B.

Note, again, that you sow a stone into your home pit when you pass it, but you skip the opponent's home pit. Moreover, stones may not be played *from* a home pit. Once a stone is "home," it stays there for the rest of the game.

Two further rules underlie much of the strategy involved in the game. One is that if you make a play that ends with the last stone deposited into your home pit, you immediately get another turn. Through careful playing, you can sometimes get several turns in a row.

The other rule is that if the last stone you play ends up in an empty pit that belongs to you, any stones in the computer's pit that's directly opposite are "captured" and placed immediately in your home pit, thus swelling your score. For example, suppose your pit C is empty and pit A contains two stones. If you play from pit A, the first stone ends up in pit B and the last one in C, which was empty. You then capture any stones that may be in the computer's pit J, which is directly opposite C. You place the stones from pit J (if any) in your home pit, and your turn ends.

Play continues until one player has no more stones in any of the six pits on his side of the board. The game is then over, and any stones remaining on the opponent's side are moved to his home

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K A L A H

pit and count toward his score. (For this reason, it's not always wise to "go out" too early!) Whoever then has the most stones in his home pit is the winner of the game.

FURTHER WRINKLES

As the computer ponders its next move, it displays "Thinking. . ." on the screen, so that you know it is doing something. As a play is made by either player, the values in the affected pits turn red momentarily so that you can better see the effect of the move.

The computer pauses briefly before continuing or prompting for your next move. If you prefer not to wait, you can end the pause by pressing the space bar.

Alternatively, you can adjust the length of the pause by changing the value assigned to the variable T1 on line 100 of the program. Decreasing that value shortens the pause between moves, and vice versa.

A word about the skill levels from which you choose at the beginning of the game: At the Beginner level, the computer takes any free moves it can find and then moves at random. At Intermediate level, the game also adds capture and capture-avoidance features to its strategy. And in Expert mode, the computer tries to determine which play leaves it in the best position with respect both to extra plays and to captures on its next move.

Your choice, also at the start of the game, of the number of stones per pit will somewhat determine the quality of the game. The default is 3, but you may select any number from 1 to 6. Choosing a greater number increases the length and complexity of the game.

The rules of Kalah are easy to learn, but you soon find that the more you play, the more strategy you discover. Try it and find out for yourself why this game's popularity has endured for hundreds of years. ☐

Michael Broussard is a systems engineer for Stratus Computer. He has written many articles for RUN, the first as long ago as April 1984.

Listing 1. The Kalah game program.

```

1 REM KALAH - M. BROUSSARD                {SHFT I}                :REM*57          SPACES}E(4 SPACES}F"
                                           :REM*46          23Ø PRINTX$"{SHFT -}{3 SPACES}{
1ØØ T1=Ø : REM DELAY BETWEEN TU          2 SHFT -s}{3 SPACES}{2 SHFT      :REM*127
RNS                                       :REM*178          -s}{3 SPACES}{2 SHFT -s}{3
11Ø DEF FNB(X)=X+14*(X>14)-1*(X        SPACES}{2 SHFT -s}{3 SPACE
>2Ø)+14*(X>27)-1*(X>33)+14*          s}{2 SHFT -s}{3 SPACES}{SHF
(X>4Ø)-1*(X>46)                          :REM*92          T -}                :REM*252
12Ø POKE5328Ø,3:POKE53281,1:PRI        24Ø PRINTX$"{SHFT J}{3 SHFT *s}
NT"{CTRL 1}{SHFT CLR}{CRSR           {SHFT K}{SHFT J}{3 SHFT *s}
DN}"TAB(18)"{CTRL 9}KALAH(2           {SHFT K}{SHFT J}{3 SHFT *s}
CRSR DNs}"                                :REM*124          {SHFT K}{SHFT J}{3 SHFT *s}
13Ø R$="{HOME}":FORK=1TO8Ø:C$=C        {SHFT K}{SHFT J}{3 SHFT *s}
$+"{CRSR RT}":R$=R$+"{CRSR           {SHFT K}{SHFT J}{3 SHFT *s}
DN}":NEXT                                  :REM*22          {SHFT K}            :REM*81
14Ø DIMR(14),C(14),A(14),S(14),        25Ø PRINT"{2 SPACES}{SHFT U}{3
T(14):FORK=1TO14:READR(K),C           SHFT *s}{SHFT I}{26 SPACES}
(K):NEXT                                    :REM*253          {SHFT U}{3 SHFT *s}{SHFT I}
15Ø PRINT"PLEASE CHOOSE SKILL L        :REM*84
EVEL:{CRSR DN}":PRINTTAB(5)           26Ø PRINT"{2 SPACES}{SHFT -}{3
"1) BEGINNER"                             :REM*195          SPACES}{SHFT -}{26 SPACES}{
16Ø PRINTTAB(5)"2) INTERMEDIATE        SHFT -}{3 SPACES}{SHFT -}
":PRINTTAB(5)"3) EXPERT"                :REM*217
                                           :REM*23Ø
17Ø PRINT"{CRSR DN}"TAB(5):INPU        27Ø PRINT"{2 SPACES}{SHFT J}{3
T"(1, 2, OR 3){2 SPACES}2{3           SHFT *s}{SHFT K}{26 SPACES}
CRSR LFs}";N$:LV=VAL(N$):I            {SHFT J}{3 SHFT *s}{SHFT K}
F LV<1ORLV>3THEN15Ø :REM*4Ø           :REM*152
18Ø N$="":INPUT"{CRSR DN}HOW MA        28Ø PRINTX$"{SHFT U}{3 SHFT *s}
NY STONES PER PIT(2 SPACES)          {SHFT I}{SHFT U}{3 SHFT *s}
3{3 CRSR LFs}";N$:N=VAL(N$)           {SHFT I}{SHFT U}{3 SHFT *s}
                                           :REM*84          {SHFT I}{SHFT U}{3 SHFT *s}
                                           :REM*238
19Ø IFN<1ORN>6THENPRINT"PLEASE        43Ø ON F GOTO 36Ø,44Ø :REM*229
CHOOSE A VALUE BETWEEN 1 AN          {SHFT I}{SHFT U}{3 SHFT *s}
D 6":GOTO18Ø                             :REM*252          {SHFT I}            :REM*252
2ØØ X$="{5 SPACES}":PRINT"{SHFT        29Ø PRINTX$"{SHFT -}{3 SPACES}{
CLR}{CRSR DN}"TAB(18)"{CTR           2 SHFT -s}{3 SPACES}{2 SHFT
L 9}KALAH(2 CRSR DNs)":F=1           -s}{3 SPACES}{2 SHFT -s}{3
                                           SPACES}{2 SHFT -s}{3 SPACE
21Ø PRINTX$"{2 SPACES}L(4 SPACE        s){2 SHFT -s}{3 SPACES}{SHF
s}K(4 SPACES)J(4 SPACES)I(4         T -}                :REM*184
SPACES)H(4 SPACES)G"                :REM*139
                                           :REM*184
22Ø PRINTX$"{SHFT U}{3 SHFT *s}        3ØØ PRINTX$"{SHFT J}{3 SHFT *s}
{SHFT I}{SHFT U}{3 SHFT *s}          {SHFT K}{SHFT J}{3 SHFT *s}
{SHFT I}{SHFT U}{3 SHFT *s}          {SHFT K}{SHFT J}{3 SHFT *s}
{SHFT I}{SHFT U}{3 SHFT *s}          {SHFT K}{SHFT J}{3 SHFT *s}
{SHFT I}{SHFT U}{3 SHFT *s}          {SHFT K}{SHFT J}{3 SHFT *s}
{SHFT I}{SHFT U}{3 SHFT *s}          {SHFT K}            :REM*13
31Ø PRINTX$"{2 SPACES}A(4 SPACE        {SHFT I}{SHFT U}{3 SHFT *s}
s)B(4 SPACES)C(4 SPACES)D(4         s)B(4 SPACES)C(4 SPACES)D(4
                                           :REM*182

```


KALAH

```

510 FORZ=1TO40:NEXTZ:IF J=0THEN      V=1THEN100      :REM*186      )+2*T(14-X)      :REM*184
550      :REM*122      870 FORJ=8TO13:X=FNB(A(J)+J):IF 1040 IF T(K)=13THENS(J)=S(J)+2*
520 I=I+1:IF(I=14ANDF=1)OR(I=7A    X>7THENIF(A(X)=0)ANDA(J)THE  T(14-K)      :REM*127
530 NDF=2)THENI=I+1      :REM*53      NS(J)=S(J)+10*A(14-X)      1050 X=T(14-K):IF X<>0THEN1090
540 IF I>14 THEN I=1      :REM*40      :REM*45      :REM*94
540 A(I)=A(I)+1:J=J-1:GOTO490      880 X=A(14-J):IFX<>0ORJ=13THEN9 1060 FOR L=1TO14-K-1:IF T(L)>0A
      :REM*1      20      :REM*178      NDT(L)+L=14-KTHENS(J)=S(J)
550 X=-I+14:IF F=1ANDA(I)=1ANDI    890 FORK=1TO14-J-1:IFA(K)+K=14-  -10*T(K)      :REM*185
<7THEN A(7)=A(7)+A(X):A(X)=      JTHENS(J)=S(J)+10*A(J)      1070 IF A(L)=13THENS(L)=S(L)+10
0:GOTO570      :REM*58      *A(14-L)      :REM*146
560 X=-(I-14):IF F=2 AND A(I)=1    900 IF A(K)=13THENS(J)=S(J)+10* 1080 NEXT L      :REM*87
ANDI>8 THEN A(14)=A(14)+A(      A(14-K)      :REM*149      1090 NEXT K:NEXT J      :REM*139
X):A(X)=0      :REM*88      910 NEXTK      :REM*162      1100 X=-999:FORK=8TO13:IFS(K)>=
570 IF (I=7ANDF=1)OR(I=14ANDF=2  920 NEXTJ:IF LV=2 THEN 1100    XTHENIFS(K)=XANDRND(-1)>.5
)THEN590      :REM*168      :REM*42      THEN1130      :REM*222
580 F=2+(F=2)      :REM*102      930 FORJ=8TO13:FORK=1TO14:T(K)= 1110 IF S(K)<X THEN 1130
590 GETX$:IFX$<>"ORX">T1 THEN 6  A(K):NEXTK      :REM*153      :REM*197
10      :REM*180      940 IFT(J)=0THEN990      :REM*83      1120 X=S(K):P=K      :REM*127
600 X=X+1:GOTO590      :REM*78      950 M=T(J):N=J:T(J)=0      :REM*227      1130 NEXTK:IF X=-999 THEN RETU
610 GOSUB730      :REM*178      960 N=N+1:IFN>14THENN=1      :REM*98      RN      :REM*227
620 IF A(1)+A(2)+A(3)+A(4)+A(5)  970 IFN=7THENN=8      :REM*139      1140 IFA(P)=0THENS(P)=-999:GOTO
+A(6)=0 THEN 640      :REM*33      980 T(N)=T(N)+1:M=M-1:IF M THEN  1100      :REM*117
630 IF A(8)+A(9)+A(10)+A(11)+A(  990 FORK=13TO8STEP-1      :REM*120 1150 RETURN      :REM*9
12)+A(13)<>0 THEN RETURN      1000 IFT(K)=14-KTHENS(J)=S(J)+  1160 PRINT"LOGIC ERROR!!":END
      :REM*130      :REM*32      :REM*30
640 PRINTMID$(R$,1,21)TAB(15)"G    1010 NEXTK      :REM*15
AME OVER"      :REM*10      1020 FOR K=8 TO 13      :REM*197
650 FORJ=1TO8STEP7:FORL=JTOJ+5:    1030 X=FNB(T(K)+K):IFX>7THENIF(
IFA(L)THENA(J+6)=A(J+6)+A(L      T(X)=0)ANDT(K)THENS(J)=S(J)
):A(L)=0:GOSUB730      :REM*149
660 NEXTL:NEXTJ      :REM*209
670 X=A(7):Y=A(14):X$=MID$("TIE  GAMEYOU WIN! I WIN! ",1+-(
(X>Y)+(X<Y)*2)*8,8)      :REM*7
680 PRINTMID$(R$,1,22)TAB(16)X$  :REM*198
      :REM*198
690 PRINT"{CRSR DN}WOULD YOU LI  KE TO PLAY AGAIN (Y/N)? ";
      :REM*186
700 GET X$:IF X$<>"Y" AND X$<>"  N"THEN700      :REM*237
710 PRINT X$;:IF X$="N"THENEND    :REM*127
720 RUN      :REM*89
730 K2=K:PRINT"(CTRL 7)"
      :REM*149
740 X=A(K):PRINTMID$(R$,1,R(K))  ;
      :REM*108
750 X$=STR$(X):IF X=0 THEN X$="  {2 SPACES}"      :REM*129
760 PRINTMID$(C$,1,C(K))X$MID$(  " ",1,-(X<10));K=K+1:IFK>1
4THENK=1      :REM*112
770 IF K=K2 THEN PRINT"(CTRL 1)  ";RETURN      :REM*51
780 GOTO 740      :REM*90
790 FORK2=1TO14:T(K2)=A(K2):NEX  TK2:P=0      :REM*91
800 X1=0:X2=0:FORK=13TO8STEP-1:  X=FNB(A(K)+K)      :REM*48
810 IFA(K)=13OR(X>7)AND(A(X)=0)  THENIFA(14-X)>X2THENX1=K:X2
=A(14-X)      :REM*92
820 NEXTK      :REM*72
830 FORK=13TO8STEP-1:IFA(K)=-K+  14THENIF(K>X1)AND(P=0)THENP
=K      :REM*168
840 NEXT K      :REM*100
850 IF P THEN RETURN      :REM*162
860 FORJ=1TO14:S(J)=0:NEXT:IF L

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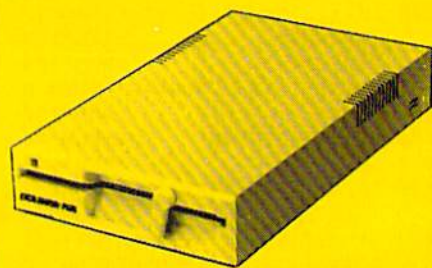
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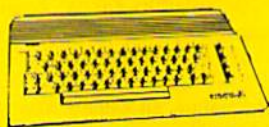
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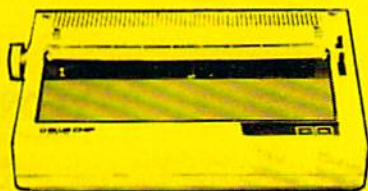
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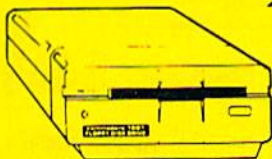


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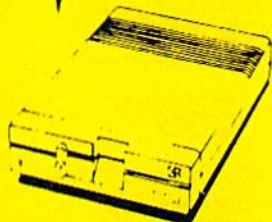


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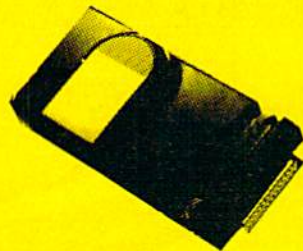
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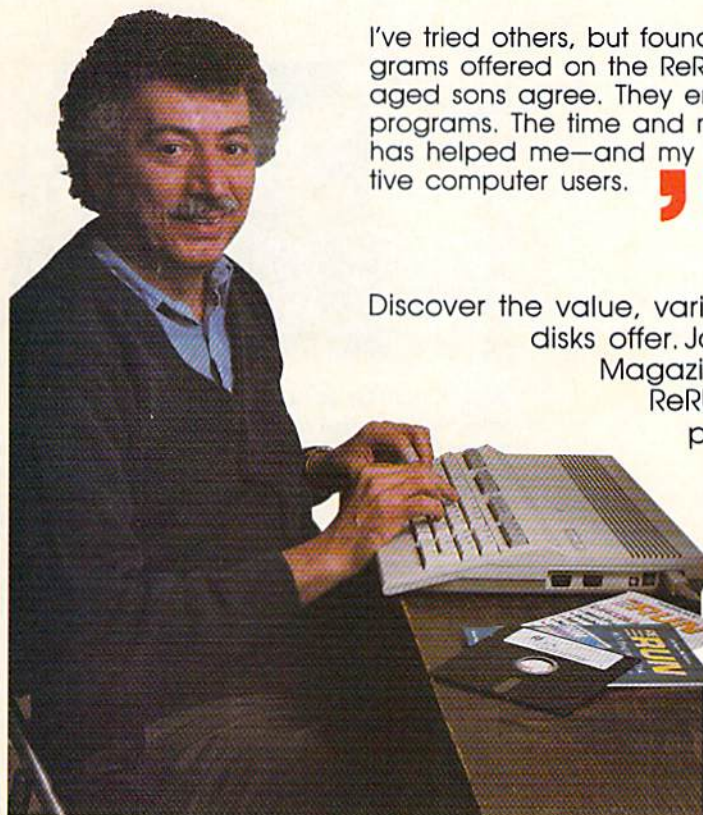
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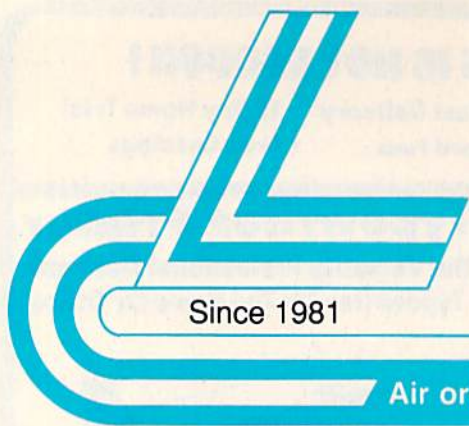
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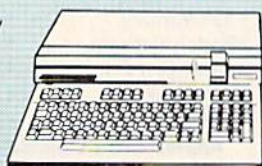
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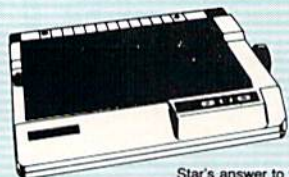


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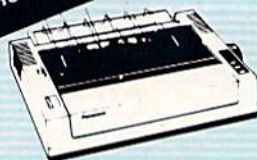
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GAMES GALLERY

Get the lead out, soldier, and take aim at the land combat adventures you'll meet in *Steel Thunder* and *Heavy Metal*.

By BOB GUERRA

SEVERAL NEW SIMULATIONS are released each year for the C-64 that let you defend the computerized skies in a modern fighter plane. Currently, computer warriors have a wide variety of aircraft to choose from, including the F-14 Tomcat, F-15 Eagle, F-18 Hornet and F-19 "Stealth" fighter. Even our silicon seas are well-defended, thanks to submarine simulations such as *Silent Service*, *Up Periscope!* and *Red Storm Rising*, as well as games like *Destroyer*, *PHM Pegasus* and *Ocean Ranger*, all of which put you in command of armed surface vessels.

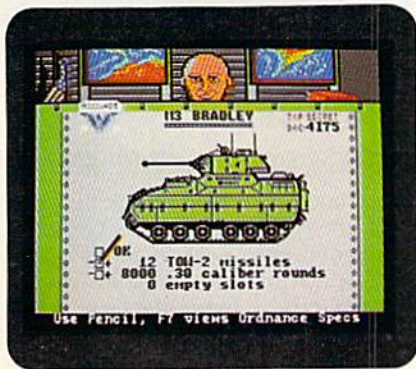
But when it comes to military land vehicles—tanks, armored personnel carriers, mobile air defense/anti-tank systems, fast attack vehicles and the like—war gamers have been left virtually unarmed.

Fortunately, software companies are beginning to fill this gap in the software arsenal. Two of the latest games to take an overland route to the front are Accolade's *Steel Thunder* and Access Software's *Heavy Metal: Modern Land Combat*.

STEEL THUNDER

If you've ever had the urge to take a spin in a modern battle tank like the M1A1 Abrams or M48A5 Patton but weren't quite prepared to spend the next few years in training in West Germany, then *Steel Thunder* is the next best thing. Besides the Abrams and Patton tanks, *Steel Thunder* can also put you in the driver's seat of the M3 Bradley or M60A3 tank. But, just because *Steel Thunder* is from Accolade, don't expect your trip to be a relaxing "test drive" up a long and winding road. Here, you have a lot more to worry about than an occasional speeding ticket from the highway patrol.

The program offers more than 20 combat missions in three areas of the world. All new recruits begin active duty in Cuba but, if you've really got what it takes to be a first-rate tank commander, you may eventually transfer to Syria or—if you're feeling brave—the most hazardous tour of duty, West Germany.

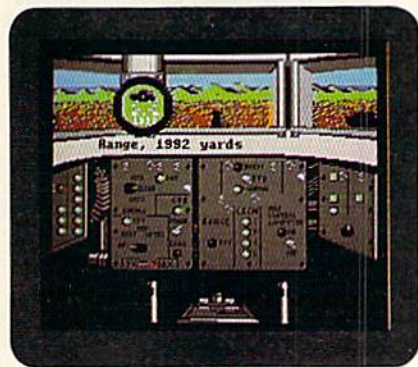


Dig the specs of the M3 Bradley tank in *Steel Thunder*.

Along the way you can advance from private to the rank of general by successfully completing a variety of dangerous combat missions, ranging from destroying an enemy mortar post in Cuba to wiping out the enemy's entire stock of nuclear, biological and chemical weapons spread out among five West German bunkers.

What gives *Steel Thunder* its realistic feel, however, isn't the types of missions—it's the appearance of the tank's interior and the three-periscope view as you roll over the hillsides.

Before designing the tanks' interiors, programmer Tom Loughry actually climbed inside an M1 and took some pictures. "I wanted to see what it really feels like to be inside the tank so that I



The graphics of the interior of the tanks in *Steel Thunder* are modeled after the real thing.

could duplicate that in the game." In addition, Loughry talked with the soldiers who use the tanks to find out about the capabilities, advantages and disadvantages of the vehicles.

In talking with Loughry, I also discovered the reason I was having such a tough time getting through one of the Syrian missions. In the mission, you are instructed by the general to go behind enemy lines and destroy an oil depot. The general suggests taking a Bradley, but Loughry had other advice: "Don't always trust the general. I mean, he does his best but you're supposed to become good enough and be able to evaluate the missions enough to pick your own tank. He suggests something that will work, but I think I'd take an M1. Your chances of survival are better."

HEAVY METAL

Back in 1983, Access Software released its first C-64 program, *Beach Head*. Designed by Bruce Carver, *Beach Head* is a multi-screen action game with realistic sound effects and dazzling graphic animation of incoming fighters and outgoing anti-aircraft shells.

In many ways, the company's latest offering, *Heavy Metal*, is similar to its original product. For *Heavy Metal*, Brent Erickson and brothers Bruce and Roger Carver teamed up to create a war game with plenty of action and some strategy elements. The action comes from three combat simulations that can be played individually or as part of the larger, tactical game.

One combat simulation lets you take the controls of an M1A1 Abrams main battle tank (MBT). Like the old arcade game *Battlezone*, the MBT sequence simply requires you to cruise around the battlefield with your 120 mm cannon blasting anything that moves. Though not equipped like the *Steel Thunder* Abrams, this tank does come with a thermal imaging system, laser range-finder, three types of shells and a smoke generator.

The second type of vehicle you can command is an air defense anti-tank

system, ADAT, for short. The ADAT can fire both missiles and 30 mm shells from its turret-based launch platform. While the joystick button is used to fire your cannon at approaching MIGs or passing T-80 tanks, missiles are aimed automatically and are launched by simultaneously pressing the firebutton on a second joystick (your big toe is great for this), by yelling "Fire!" (or some other word that isn't likely to cause the inadvertent evacuation of your apartment building) into an Access LipStik or by pressing the space bar on your 64. Surprisingly, according to both Roger Carver and Brent Erickson, the method of choice around the Access camp is the space bar.

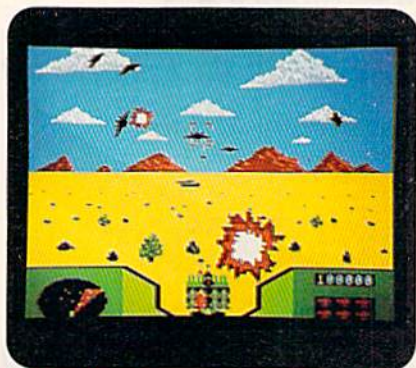
The third combat sequence, the fast attack vehicle (FAV), is like a dune buggy with a TOW missile launcher attached. Your object here is to drive through many defense levels while destroying or avoiding incoming artillery shells, enemy tanks and helicopters, and wending your way around various types of rubble strewn about the battlefield.

In the tactical game, your goal is to defend your Tactical Command Center (TACC) against enemy forces by using all three types of units mentioned above, along with a fourth unit of your choice. At the start of a game, you're shown a map of the area surrounding your TACC. The positions of the attacking enemy units, as well as your own four units, are displayed along with statistics describing your units' strength and supply state.

Although you can play the entire game from the map by instructing your units to move, engage the enemy or resupply when necessary, this approach will never result in victory. You enter each conflict outnumbered and, if left to computer control, your existing forces will perform only as well as the enemy, ultimately losing by attrition. What you must do to win is to alternate between tactical command and direct control of one of your units—preferably the one you're most successful with in battle.

Brent Erickson also suggests attacking the enemy as far away from the TACC as possible and cautions that the enemy's main objective is to reach the command center. "If you don't engage the enemy, they'll go right around you and head for your TACC." Erickson further suggests that if the enemy does take control of your headquarters, you can quickly regain control by engaging the enemy unit in combat.

The possibility of a sequel to Heavy Metal is still up in the air. According to



Ka-boom! Right on target! But watch out for approaching MIGs in Access Software's Heavy Metal.

Erickson, "we're kind of waiting to see what the response is to [Heavy Metal]; if it's good, then we'll do another one."

So which war game should you buy if a limited defense budget forces you to make a choice? I suggest Steel Thunder because it's by far the more richly detailed and realistic of the two, not only graphically but also in terms of mis-



sions, instrumentation and control. However, if you can appropriate additional funds from domestic spending, then Heavy Metal is a good second line of defense. ■

Bob Guerra, editor for a Boston hospital, has successfully fought his way through many war games.

STEEL THUNDER STRATEGY HINTS

1.—Learn to control sight magnification and slew rate so you can quickly see targets on the horizon and destroy them before they get close enough to destroy you.

2.—Once you spot enemy vehicles, slow down and, as they come into range, pick them off before they start putting holes in you. Also scan the horizon continuously with your three-power scope and learn to pick up enemy vehicles when they're still just dots.

3.—If all else fails, lay smoke. Then, either go slow enough or back up to stay in the smoke. While surrounded by smoke, you can see the enemy by using your thermal gun-sight, but they can't see you.

4.—Of the three types of external armor—tank treads, sand bags and blazer reactive—the blazer offers the best protection in all situations.

5.—Use a shell like the APFSDS armor-piercing round to destroy enemy tanks at long range.

6.—Try to control everything from the commander's turret, which provides the greatest viewing range.

HEAVY METAL STRATEGY HINTS

1.—During the ADAT sequence, the single MIGs that fly in from the side of the screen are worth more points than those that are in formation. Also, the T-80 tanks are worth twice the points of MIGs.

2.—The FAVs are a good supporting unit to select because they're faster than all other types of units and can head off the attacking enemy sooner.

3.—While at the tactical map, monitor the fuel and ammunition supplies of your units carefully. Remember, once a unit's fuel supply has been depleted, there's just no way to make it back to the TACC to get more.

4.—Keep an eye on the radar display during the ADAT sequence. Sometimes it's easy to forget about a fighter squadron attacking from the side if you rely solely on the view from your turret. ☐

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MAIL RUN

Readers applaud our disk-based GEOS Power Pak, berate us for publishing so many games and deplore our downgrading of the Lt. Kernal.

FANTASTIC VOYAGE

Please thank author Ellen Rule for the fantastic article in the December 1988 issue of *RUN*, "Journey to the Center of Your Commodore." I did find an error, however. The article is confusing about the location of the PLA and SID chips. The close-up photo on page 82 shows the SID chip directly east of the CPU, and the large photo on the same page clearly shows the PLA is south of the SID.

—JAMES C. HASKELL
PRESQUE ISLE, ME

You're absolutely right, Jim. Our technical editors used a motherboard from a 64C for illustration, and it's configured a bit differently from the author's C-64.

—EDITORS

DOWN WITH GAMES

Polls do not indicate that most *RUN* readers are interested in games. So why allocate so much editorial space to games? Polls do indicate a more mature reader, in age, education and income (see "RUNning Ruminations," July 1988). Do what a computer magazine was meant to do: educate, solve readers' problems and review productivity and utility software (games will always sell to kids and technical editors). So please, no more games!

—DANIEL H. TOTH
BATH, SC

I'm 62 years old, I've worked as an electronics engineer for 40-plus years, and I have absolutely no earthly use for all those C-64 games being advertised on far too many *RUN* pages.

—JOHN G. SCHMID
LOMPOC, CA

I'm sick of games! I use three C-64s to take care of my business and home needs. They do everything from word processing to scientific work. But no games! I've looked through your advertisers' ads for the past three months; no spreadsheet programs, no database programs. Just games!

I know many Commodore users who'd like to read more about business applications. I hope you recognize the fact that many of us use the Commodore in everyday life. We need you. We need product support. Not games!

—JOHN W. CORR
MARTINEZ, CA

*Anti-gamers are no doubt dismayed to see *RUN*'s new column, Games Gallery, devoted to reviews and discussion of games, but we started it in response to all the interest expressed by pro-gamers.*

C-64 users complain that we devote too much space to the 128, and vice-versa. We try to maintain a balance and print what our readers want and need, but not all readers' wants and needs are alike, so obviously we can't please everybody. Sorry about that.

—EDITORS

MEASURING UP

Michael Broussard's Measure Mate program ("For Good Measure," *RUN*, November 1988) is wonderful! I was able to consolidate a lifetime collection of weight-and-measure charts and verify most of the values.

Here are some additional conversions your readers might want to include.

2065 DATA 1,1,219.456,CABLE LENGTHS :REM*217 (120 fathoms)
2105 DATA 1,4,1.268604,CHALDRONS :REM*103 (36 bushels)
2153 DATA 1,1,20.1168,CHAINS :REM*169 (66 feet; surveyor's measure)
2156 DATA 2,3,404.685637,CH2,CHAINS2 :REM*125 (10 square chains = 1 acre)
2173 DATA 1,4,3.60556416,CORDS :REM*134 (8 cord feet)
2176 DATA 1,4,45069552,CORD FEET :REM*30 (16 cubic feet)
2235 DATA 1,4,9.85787297E-6,DESSERTSPOONS :REM*231
2245 DATA 1,4,8.21489415E-8,DROPS :REM*218 (60 drops = 1 teaspoon)
2415 DATA 1,4,2384802,HOGSHEADS :REM*116 (63 gallons)
2693 DATA 1,1,10000,MYRIAMETERS :REM*16
2696 DATA 1,1,1853.184,NAUTICAL MILES :REM* (6080 feet)
2855 DATA 1,3,1011.7141,ROODS :REM*130 (4 roods = 1 acre)
2885 DATA 1,4,99477515,STERE :REM*153
2893 DATA 1,4,1.47868095E-5,TABLESPOONS :REM*149
2896 DATA 1,4,4.92893648E-6,TEASPOONS :REM*14

Also, my source has different values for rods, so you may want to make these changes:

2840 DATA 1,1,5.0292,RODS :REM*
2850 DATA 1,3,25.292853,RODS2 :REM*119

—MARJI UMBRIGHT
HOUSTON, TX

We've devoted 4⁹/₁₆ column inches, or 27¹/₂ picas, of space to your additions and corrections. Thanks bushels, Marji.

—EDITORS

HOW DARE YOU!

I was extremely disappointed in your review of the Lt. Kernal. It lacked an overall sense of the product, and several features were mentioned only briefly or completely omitted. In my opinion, the Lt. Kernal is the best hard drive available for the Commodore computer.

I admit that no hardware is perfect, but the Lt. Kernal deserves a better grade. I've had little trouble with the drive. ▶

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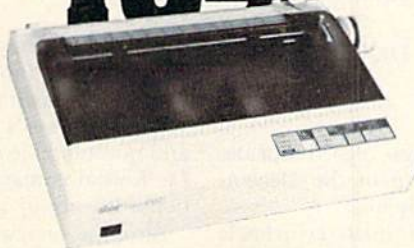
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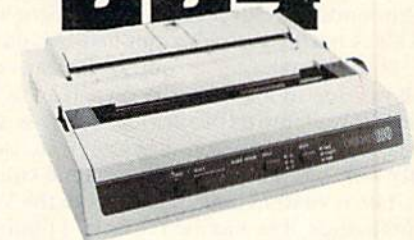
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R3C

MAIL RUN

The manual is helpful, though some commands could be explained more fully.

The reviewer mentioned he had trouble using the Basic Load "\$" command. Read the manual! To get the directory, just type in DIR.

In closing, I think the review should be repeated. And, this time, treat the Lt. Kernal fairly and accurately, or please do not review it at all.

—JAMES DEAN WALLACE
CANON, GA

I've long held the reviews in *RUN* in high regard, but the review of the Lt. Kernal hard disk drive in the December 1988 Hardware Gallery is not one of them.

The reviewer claims you must connect "insulated clip leads to a few small chips." The fact is, you connect one clip lead to one chip in the C-128 version, and one clip lead to one chip and one clip lead to one resistor in the C-64 version. This is hardly the effort implied by your reviewer.

He also lambastes as "quirksome" an operating system that allows one to load any file merely by typing 1 filename and have it load into its proper load address. Quirksome? Hardly. The Lt. Kernal operating system is so user friendly that even my wife can use it, and she's a total computer illiterate!

The reviewer could benefit from the Validate and Recover commands, if he has the 7.1 DOS. I doubt he took the trouble to look at these commands, since he seems to know nothing about them and laments the "loss" of his system index, which

these commands would rebuild for him.

Saying the Lt. Kernal's operating system is "intimidating and quirksome" only proves his total lack of familiarity with the equipment.

—FRED S. DART
SALEM, UT

I've come to rely on *RUN*'s accurate software and hardware reviews to assist me in making purchasing decisions. But this time the Lt. Kernal review fails to meet this standard.

The reviewer's article is rife with technical inaccuracies and questionable comments. For example, he states that the Lt. Kernal contains "... the circuit board from a conventional PC power supply. . .", which it does not.

Also, the reviewer was taken aback by the "... status line with a lot of unfamiliar information." The manual supplied with the drive, which he apparently skimmed over, explains the "unfamiliar information."

The comments about transferring files from floppy disk to the Lt. Kernal further support my contention that he skimmed the documentation. The DOS includes several utilities for performing such operations, all of which are discussed in the manual.

There are many other inaccuracies and questionable comments that would make my letter too long to publish, but I think you get my drift.

—WILLIAM J. BRIER
BENSENVILLE, IL

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MAIL RUN

Like all reviews, our review of the Lt. Kernal was one person's (John Premack, who has extensive experience as a Commodore user and SYSOP for the Boston Computer Society) experience and opinion about using the product. We've read other reviews of this hard drive, some of which are equally critical of the product for its lack of documentation in some areas, its expense, and its being difficult or inappropriate or unsuitable for the average Commodore home computer user. However, we are pleased to hear that you and many others enjoy using this system and have experienced no difficulties.

—EDITORS

MUCH ADD ABOUT NOTHING

I enjoyed your article on the pros and cons of Quantum-Link (Telecomputing Workshop, *RUN*, December 1988). While I agree with the article in general, I feel there are a few things you neglected to mention.

Q-Link likes to advertise itself as an inexpensive online service; they even give you a free "Plus" hour. I was disappointed to find that the basic services consist of the newspaper and an encyclopedia. That's nice, but how much of an encyclopedia can anyone read in one sitting? Other functions, such as downloading, Email or anything fun, cost extra. I was amazed at how quickly my free hour of Plus time went by, because 80 percent of that hour was spent waiting for Q-Link to get around to me again.

When I cancelled my membership, a Q-Link sales representative asked me why, and I gave her an earful. I hope Q-Link will consider my comments and improve the system.

—JOSH JACOBY
ONTARIO, CA

C-128 R.I.P.

I'm amazed! Commodore has discontinued the C-128, and I was just about ready to buy one. The 128D sells for \$500 with a disk drive, but that's too much to pay. With that money, I'd buy an Amiga 500 with a disk drive. Besides, I already have a 1571 drive, which I had planned to use with the plain C-128 I am now apparently too late to get.

—DAVID DUNSON
WICHITA, KS

Alas, the standard C-128 computer has gone the way of the C-16, Plus/4 and VIC-20—they all are no longer being produced. Perhaps discount or mail-order outlets can help, or maybe one of our readers knows of a distributor who is still selling the machines but doesn't advertise the fact. Write in and let us know.

—EDITORS

GEOKUDOS

As an editor for the GEOS section of a disk-based, monthly newsletter, I recently reviewed *RUN*'s GEOS Power Pak and gave the product a favorable rating. Although I was pleased with the majority of its utilities, I thought the terminal program fell short because it lacked an auto-dial feature. The product could be vastly improved by adding this feature.

—DAVID SWAINBANK
ST. ALBANS, VT

Thanks for the positive review, David. Be assured that the next version of geoTerm, the GEOS terminal program, will contain the auto-dial capability, among other new features.

—EDITORS ■

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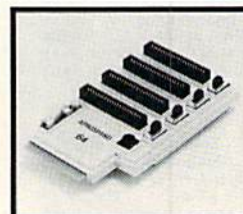
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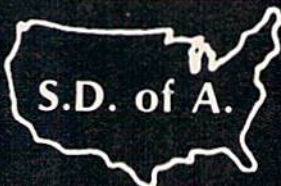
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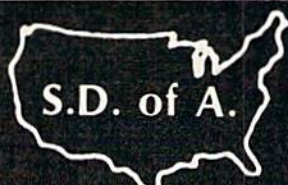
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COMMODORE CLINIC

Commonly asked questions about the 1581 disk drive, transferring text files to an Amiga and dealing with quirks in disk-file programs.

By LOU WALLACE

Q *Is there a nibbler that will copy disks from my 1541 drive to my 1581? Since very few stores sell 3 1/2-inch disks for the 1581, can I purchase them through mail order? Also, is there any software that lets you upload and download from the 1581 drive?*

—SHIBU KINATUKARA
YONKERS, NY

A The 1581 continues to be a mystery to many Commodore users, as your questions so vividly point out. First, there is no such thing as 3 1/2-inch disks made especially for the 1581. All it requires are double-sided, double-density (DSDD) disks, which are the same disks used by the Amiga, the Apple Macintosh and many other computers that use the 3 1/2-inch format. You can order them through the mail if you wish, and in most cases they'll be a little cheaper that way. But almost any computer store carries them.

You cannot use any disk nibbler to copy a 1541 format disk to a 1581 format disk. Nibblers work by reading each track and sector of the disk, then writing them back in the same location on the destination drive. This will not work when copying from a 1541 or 1571 to a 1581. The best way is to use a file copier.

Just about every terminal program I own works with the 1581. Look in the public domain libraries of your local BBS or users group for a good terminal.

Q *I'm a member of the Southeast Louisiana Commodore Users Group, and we have a problem we hope you can help us with, the answer to which might be useful to other users groups as well. Our group consists of C-64, C-128D and Amiga users. We use an Amiga to produce our newsletter, but many of the articles submitted are in standard C-64/128 format. My question is, "How can we transfer and use Commodore text files on an Amiga?"*

—RUSSELL A. DAVIS
LAROSE, LA

A First, make sure your C-64 and 128 authors use a word processor

that can save files in ASCII (SEQ) format. If possible, files should be saved in true ASCII format (RUN Script does this nicely) and not just Commodore ASCII. Once the files are in this format, they can be used by the Amiga as soon as they're transferred.

The easiest way I know to transfer is to copy all the files to a 1581 disk, then use a utility called Transfer, supplied with release 2 of the Amiga C-64 Emulator from ReadySoft (PO Box 1222, Lewiston, NY 14092; 416-731-4175). This program allows the Amiga to read 1581 disks and transfer their contents to an Amiga-formatted drive. And, of course, once on the Amiga disk, they'll be available for newsletter production.

A second method is to connect a 64 or 128 to the Amiga by a null modem cable and use a terminal program on both machines to send and receive the ASCII files. This is somewhat inconvenient, as you need to have both machines near one another. Still a third way is to use modems and the phone line to send the files.

Q *Is there an adapter that will let me use my Commodore 64 joysticks on my IBM computer?*

—RODNEY TRAUB
ROCHESTER, MN

A None that I know of. The C64/128 joystick is a simple 8-way directional switch, while those for IBM PCs and compatibles use an analog joystick that has 256 directions. These are more complex and more expensive. But I suspect the price of any adapter designed to use a 64 joystick on an IBM would cost as much, if not more, than the IBM joystick itself. You'd be better off getting one made for your PC.

Q *Help! I started to format a disk, only to discover that I had inadvertently inserted the wrong disk in the drive. I pulled it out quickly, and have been able to get most of my files off it. But every time I try loading the last four files, I get a File not Found*

error. Since they're on the directory, why can't I load them? Can they be restored?

—ANDREW VAN BAESCHOTEN
SOMEWHERE IN BELGIUM

A Frankly, you're quite lucky you managed to recover any of the files at all. My guess is that in another few seconds everything on the disk would have been gone for good. The reason you're unable to load the files is that the formatting process had reached the area of the disk where they were actually stored, but before the disk sector where the directory is written. Their names still show up when you read the directory, but the actual files are gone. It's unlikely that you'll be able to get them back, even if you're technically adept and know how to use a disk editor.

Accidentally formatting a disk can be a terrible disaster, and the only foolproof solution is to always keep a backup of important data files or programs. Remember, sooner or later everyone loses data, either by accidental erasure or formatting, hardware failure or even physical damage to the disk itself. In these situations, only a backup will save you. If the data is important, spend the few seconds it takes to duplicate the disk. It can be time well spent.

Q *I'm writing a C-128 relative file database program that uses a sprite as a cursor to move between fields. Sometimes, for no apparent reason, the program just hangs up and the disk light comes on, but control never returns to the program. At other times, when doing exactly the same thing, the program works perfectly. Are there any bugs in relative files on the C-128?*

—JEFFERY BARNES
JACKSONVILLE, FL

A I wouldn't call them bugs, but there definitely are some odd quirks in the file-access system on both the 64 and 128. For example, when programming relative files, it's a good practice (and recommended in the 1571 disk drive manual) to position the relative file pointer not once, but twice

before writing to the record. This ensures that it's always where you think it should be.

Another quirk concerns sprites and disk access. It's a good idea to turn off sprites when accessing the disk drive from within a program, then turn them back on when you've finished reading or writing a file. Sometimes, if one or more sprites are on, you'll get the effect you described. It also makes a difference where the sprite is on the screen. Some screen positions are more prone to this effect than others.

Q I'm writing a C-128 Basic 7.0 program that plots high-resolution graphs of mathematical equations. I'm using the DEF FN command extensively in the program to allow me to create complex equations and use them almost like new commands. I can even combine functions to create more complex functions in much the same way that some of the more advanced Basics on the



newer computers let you create new commands from subroutines. Everything works fine, but as soon as I try to plot the results, my new functions quit working and seem to disappear, giving me an Undefined Function error message! Is there something wrong with the function command?

—TOM KERTILE
SAN FRANCISCO, CA

A No, there aren't any real bugs, but there is a small requirement to using the DEF FN with bitmap graphics. Unless I'm greatly mistaken, you're defining the functions early in the pro-

gram, before you allocate the graphics screen. If so, this is your problem. The DEF FN command uses some of the memory where graphics screens are defined. If you allocate a graphics screen before defining the functions, the function definitions will be stored elsewhere in memory and be safe. Otherwise, by defining them first, the definitions will be erased when the graphics screen is created, and you'll get the error message when you try to call them. The best solution is to issue a Graphics command at the beginning of the program, before the DEF FN command is used. ■

Do you have a problem or question about your Commodore computer system, software or programming? Just send your questions to: Commodore Clinic, RUN Magazine, 80 Elm St., Peterborough, NH 03458. Queries are answered only through this column, and, due to the volume of mail, only questions likely to appeal to the majority of our readers can be published.

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TELECOMPUTING WORKSHOP

There's a world of information and entertainment awaiting you on local BBSs, including RUN's RUNning Board.

By LOUIS WALLACE

CONTINUING WITH THE TOPIC of telecommunications systems, this month I'll turn the focus to local bulletin board systems (BBSs). In particular, I'll discuss *RUN's* own BBS, the *RUNning Board*, where I am the *SYSOP*.

For the benefit of those who have never previously gone online, what follows is a brief explanation and description of a BBS's features. The traditional bulletin board, such as those you hang in your kitchen or den, is used to leave messages for others. A computer bulletin board is used for the same reason, but in most cases, the available features go beyond merely leaving messages. For example, a BBS can hold lengthy documents like tutorials or articles.

More advanced options include electronic mail (Email) that can be addressed to an individual or to the public. Most modern BBS software packages also let the user send private mail. As the name implies, private mail can only be read by the sender and the person it is addressed to. (On some systems the *SYSOP* can, if absolutely necessary, read private mail.)

One of the most popular features of a BBS is the ability to upload programs to and download programs from the BBS's private library. Depending on the storage capacity of the BBS, a library can hold anywhere from a few dozen to literally thousands of public domain programs.

THE RUNNING BOARD

RUN's *RUNning Board* contains all of the aforementioned features, and more. To access our BBS, you need either a C-64 or C-128 equipped with a modem and terminal program. You can use just about any modem, including 300-, 1200- or 2400-baud speeds. The BBS detects what you use when you call and configures itself to that speed.

The number for the *RUNning Board* is 1-603-924-9704. It is available 24 hours a day for anyone to call and sign on as a member. The first time you log on to *RUN's* BBS, you're asked a few general questions and given a pass-

word; you then have access to the system and its resources. Once online, you're presented with a menu of options for each section of the BBS. This makes the *RUNning Board* extremely easy to use even for first-timers. After you develop some expertise with the system, you can work on two more advanced levels that don't require on-screen menus.

TERMINAL SOFTWARE

While almost any general-purpose terminal program can be used to access a BBS, some contain more features than others. The two packages I use most often with the *RUNning Board* are *RUN Term*—available on the *RUN Works* disk—and *geoTerm*, one version of which is available on *RUN's* *GEOS Power Pak I*. Another will soon appear on *Power Pak II*. There are good commercial terminal programs available, and you can find many public domain packages in your local users group library or online a BBS.

If you're interested in uploading or downloading software, your terminal program must support one or more transfer protocols. These protocols are specialized techniques used in transferring programs and data over phone lines. The two most popular protocols in the Commodore community are *Punter* and *Xmodem*. Others that are gaining support are *Ymodem* (also called *1K Xmodem*) and *Xmodem-CRC*. The *RUNning Board* supports all of these protocols except *Punter*, and it has an *ASCII Text Transfer* mode, which can be used for sending or receiving pure text files.

DOWNLOADING AND UPLOADING

As a *SYSOP*, I find that one of the most commonly asked questions from new users is: "How do I download a program?" Depending on the software used, the specifics for downloading can vary slightly from one BBS to another. For the most part, however, the technique the *RUNning Board* uses is comparable to other BBSs, so I'll use it as an example.

First, determine what program you want to download. On our system, the software library is broken down into subject categories. A partial listing of the categories we've created so far includes *Fun and Games*, *Productivity*, *GEOS*, *Basic 8*, *The Best of Public Domain*, *C-128 Only*, *Graphics*, *Sound and Music and Magic*.

The total number of programs available is in the hundreds. If you select the *List* option from the *Files* menu and tell the BBS what category you want, it gives the names, sizes, times required to download and brief descriptions of the files in that category. Here's a short example from *Fun and Games*:

```
Listing : [A] — Fun and Games
CASTLE.C64  20,352  10/24/88
  C64 graphic adventure
  DwnLds: 14  Trans Time 00:03:39
CREEPS.SDA  15,872  10/26/88
  C64 arcade game in a self-
  dissolving ARC
  DwnLds: 15  Trans Time 00:02:51
```

If you decide that you want to download *CASTLE.C64*, you select *Download* from the *Files* menu. When the BBS asks what file you want, you enter *CASTLE.C64*. If you haven't chosen a default transfer protocol, you're given some to pick from. Since I always select *Xmodem*, I get the following message:

```
READY TO SEND CASTLE.C64 USING
XMODEM. PRESS CONTROL-X TO
ABORT.
```

Now, in order to complete the downloading link, instruct your terminal program to begin receiving a download using the same protocol as the BBS. I suggest you determine that before you log on to the BBS, because how you do this depends entirely on the software you're using. With some terminals, this step merely means selecting a *Menu* option; with others, it's a specialized keypress (the C-128 version of *RUN Term* uses *ALT/D* and the C-64 version uses *Commodore/D*). *GeoTerm* has you select a menu option with a mouse.

Once you tell the terminal package to receive a file, it handles everything

and simply lets you know how many blocks have been sent. When the file finishes downloading, you're returned to the normal BBS menus.

Uploading a file to a BBS is accomplished in much the same manner, except that you must tell the system what directory to store it in and tell your software to send, instead of receive, a file. Some systems have options for password-protecting uploads so only those who know the password can download the file. And, on many BBSs, including the RUNning Board, you get bonus on-line time for uploading public domain programs to share with others.

EMAIL

Electronic mail is an important part of any BBS, and the RUNning Board supports it. Users can send and receive messages and letters up to 150 lines in length. While letters can be made public, most personal mail is marked private and is only available to the person it's intended for. Once a message has been sent, it waits until the recipient logs on, then tells him or her that mail is waiting.

One of the nice things about Email is that you can generate dialogues on a lot of different topics. The RUNning Board offers you the option of making multiple replies to a specific message. You can also view replies and follow the trail of a subject that might have built up over a number of weeks.

Another Email feature notifies you when other online folks have received



the mail you sent them. This is useful when a long period of time has passed after you originally posted messages. Scanning of messages is also supported, including an option to report only those that were posted since the last time you logged on.

A good way to look for topics is with a Text Search. If you were only interested in messages on games, for example, you can get a list of those messages that have the word "games" in them. Because messages can be categorized in much the same way as programs, you can customize your account to report only on those topics you're interested in.

JOIN US!

One of the problems we've had with our BBS concerns the system's capacity. Earlier BBS systems we used were somewhat limited in the number of messages, programs and users they allowed. While systems like these are fine for local BBSs, we needed one with a very large capacity. We settled on Wildcat!, which runs on an IBM-PC dedicated entirely to the BBS. Besides allowing for a 300-, 1200- or 2400-baud

modem, we added a 60-megabyte hard disk drive to give us enormous program and Email storage. It also supports over 32,000 users, so we expect it to last us for a year or two.

We welcome and encourage all RUN readers to log on to the RUNning Board. The only cost to you is the phone call, and, besides all its other features, the RUNning Board is a great way to ask questions of and get answers from the RUN staff.

RUNNING ON Q-LINK

I want to take this opportunity to let you know about another aspect of RUN's commitment to Commodore telecommunications: the RUN area on QuantumLink. In cooperation with Quantum Computer Services, we've set up our own private area in the News and Information section of the Commodore Information Network.

Just as on the RUNning Board, we have our own RUN Software Libraries, a message section for Letters to the Editor, monthly online articles and a lot more. Staffed entirely by RUN editors, it's the perfect place to find programs and information from RUN. If you're a Q-Linker, we invite you to stop by and visit with us. ■

Louis Wallace, RUN's technical manager, fills in this month for Telecomputing Workshop's regular columnist, Loren Lovhaug. You can send Lou electronic mail on Q-Link (LRW or LouWallace) or on GENie (LRWallace).



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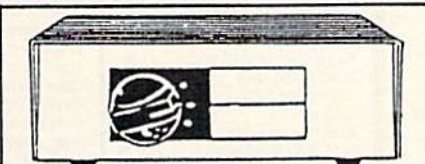
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RUN PAINT

From p. 31.

```

111 DATA 2229293A20F920312CC7 2      09E20D1282230433030 2229008      1008B1D5A009E      :REM*147
      8313333293A20F92033 2CC7283      01D50008B2041      :REM*147
      13334293A20F9      :REM*165
112 DATA 20352CC728313335293A 2      322303A4F422E525022 2C382C3      114 DATA 2034333532000000A0      :REM*125
      :REM*147
113 DATA B23120A72041B2323A20 9      :REM*125
115 DATA -1      :REM*226
    
```

Listing 2. Create RUN Paint Object boot.

```

0 REM CREATE RUNPAINT OBJECT BO      SC(L$)-55      :REM*136      SC(H$)-55      :REM*56
  OT      :REM*63      45 BY=H*16+L:PRINT#8,CHR$(BY);      85 L=VAL(L$):IF L$>"9" THEN L=A
5 OPEN 8,8,8,"OB.BOOT RP,P,W"      :REM*67      SC(L$)-55      :REM*84
      :REM*19      50 NEXT:GOTO 10      :REM*115      90 BY=H*16+L:PRINT#8,CHR$(BY);
10 READ A$:IF A$="-1" THEN CLOS      55 IF LEN(A$)<21 THEN B$=A$:GOT      :REM*148
  E8:END      :REM*78      O 70      :REM*184      95 NEXT:GOTO 10      :REM*160
15 IF LEN(A$)<62 THEN 55      :REM*254      60 IF LEN(A$)<42 THEN B$=LEFT$(      100 REM HEX DATA FOR OB.BOOT RP
      :REM*242      A$,20)+RIGHT$(A$, (LEN(A$)-21      :REM*242
20 B$=MID$(A$,1,20)+MID$(A$,22,      ):GOTO 70      :REM*137      101 DATA 000CA9008D00FFA900A2 0
      20)+MID$(A$,43,20)      :REM*242      65 B$=LEFT$(A$,20)+MID$(A$,22,2      02068FFA208A900A000 20BAFFA
25 FOR I=1 TO 30      :REM*181      0)+RIGHT$(A$,LEN(A$)-42)      :REM*165
30 C$=MID$(B$, (I*2)-1,2):H$=LEF      70 FOR I=1 TO LEN(B$)/2:REM*221      102 DATA BDFFA200A011A90020D5 F
  T$(C$,1):L$=RIGHT$(C$,1)      :REM*209      75 C$=MID$(B$, (I*2)-1,2):H$=LEF      F4C0011303A4F422E52 5000000
      :REM*209      T$(C$,1):L$=RIGHT$(C$,1)      :REM*155
35 H=VAL(H$):IF H$>"9" THEN H=A      :REM*140      103 DATA -1      :REM*214
  SC(H$)-55      :REM*85      80 H=VAL(H$):IF H$>"9" THEN H=A
40 L=VAL(L$):IF L$>"9" THEN L=A
    
```

Listing 3. Create RUN Paint Sys. Stuff file.

```

0 REM CREATE RUNPAINT SYS.STUFF      0FF0000FF0000FF0000 FF0000F      FF000000000000 :REM*151
  .H FILE      :REM*125      F0000000000000 :REM*35      116 DATA 00000000000000000000 0
5 OPEN 8,8,8,"SYS.STUFF.H,P,W"      102 DATA 00000000000000000000 0      00000000000000000000 0000000
      :REM*120      00000000000000000000 00000000      :REM*52
10 READ A$:IF A$="-1" THEN CLOS      0000000000000000 :REM*42      117 DATA 00000000000000000000 0
  E8:END      :REM*78      103 DATA 00000000001000008000 0      00000000000000000000 0000000
15 IF LEN(A$)<62 THEN 55      0010000080000400000 0200000      000000FF0000FF :REM*107
      :REM*254      00000200000004 :REM*90      118 DATA 0000FF0000FF0000FF00 0
20 B$=MID$(A$,1,20)+MID$(A$,22,      104 DATA 00000000000000000000 0      0FF0000FF0000FF000 0000000
      20)+MID$(A$,43,20)      :REM*242      0000000000000000 0000000      :REM*252
25 FOR I=1 TO 30      :REM*181      105 DATA 000000000000000010 0      00000000000000000000 0000000
30 C$=MID$(B$, (I*2)-1,2):H$=LEF      0100000000020020000 0002008      00000000000FF :REM*173
  T$(C$,1):L$=RIGHT$(C$,1)      :REM*209      0000000000108 :REM*107      120 DATA FF00FF0000FF0000FF00 0
35 H=VAL(H$):IF H$>"9" THEN H=A      106 DATA 0000000080004000000 1      0FFFF00FF00FF00 FFFF00F
  SC(H$)-55      :REM*85      0000000400000000800 0100000      :REM*108
40 L=VAL(L$):IF L$>"9" THEN L=A      00004200000000 :REM*97      121 DATA FF00FF0000FF0000FF00 0
  SC(L$)-55      :REM*136      107 DATA 04000400000000400080 0      0FFFF00FF00FF000 0000000
45 BY=H*16+L:PRINT#8,CHR$(BY);      :REM*67      0600000F00000F00000 6000000      00000000000000 :REM*160
      :REM*115      108 DATA 00000000000000000000 0      000000000000004000002000 0
50 NEXT:GOTO 10      :REM*184      00000000000000000000 0000000      0100000080000040000 0000000
55 IF LEN(A$)<21 THEN B$=A$:GOT      :REM*44      0000000000000000 :REM*44      122 DATA 00008000004000002000 0
  O 70      :REM*137      109 DATA 00000000000000000000 0      00000000000000000000 0000000
60 IF LEN(A$)<42 THEN B$=LEFT$(      FE000FF0000FF :REM*26      00000000000000000000 0000000
  A$,20)+RIGHT$(A$, (LEN(A$)-21      110 DATA E0007FC0003F8000E00 0      0040000080000100000 2000004
  ):GOTO 70      :REM*112      00000000000000000000 0000000      00000800000000 :REM*177
65 B$=LEFT$(A$,20)+MID$(A$,22,2      :REM*112      00000000000000000000 0000000
  0)+RIGHT$(A$,LEN(A$)-42)      :REM*140      111 DATA 00000000000000000000 0      00000000000000000000 0000000
70 FOR I=1 TO LEN(B$)/2:REM*221      :REM*142      00000000000000003C00 01FF800
75 C$=MID$(B$, (I*2)-1,2):H$=LEF      :REM*177      7FFE00FF0001F :REM*142
  T$(C$,1):L$=RIGHT$(C$,1)      :REM*140      112 DATA FFF83FFF003FFF07FFF F
35 H=VAL(H$):IF H$>"9" THEN H=A      :REM*177      E7FFF0000000000000 FFFF00F
  SC(H$)-55      :REM*56      FFF0000000000000 :REM*177
85 L=VAL(L$):IF L$>"9" THEN L=A      113 DATA FFFC3FFF001FFF80FFF F      127 DATA E8E8F1F1E2E244442E A
  SC(L$)-55      :REM*84      007FFE001FF80003C00 F000000      AAFFFFF5555FFFAAAA FFFF555
90 BY=H*16+L:PRINT#8,CHR$(BY);      :REM*175      0000000000000000 :REM*175      5FFFFAAAF0000 :REM*132
      :REM*148      114 DATA 00000000000000000000 0      128 DATA 5555FFFAAAFF000000 F
95 NEXT:GOTO 10      :REM*160      00000000000000000000 0000000      FFFF0000000000000000 0000000
100 REM HEX DATA FOR SYS.STUFF.      :REM*54      CFFFF3333FFF :REM*59
  H FILE      :REM*225      115 DATA 00000000000000000000 0      129 DATA CCCCFFFF3333FFF0000 F
101 DATA 17F7FF0000FF0000FF00 0      00000000000000000000 000000F
    
```


RUN PAINT

```

8111122224444      :REM*60      033330C0C3333      :REM*10      81C10222041C0      :REM*135
130 DATA 88881111222244448888 1 142 DATA C0C033330C0C33337C7 8 154 DATA CCCCCCCCCCCCCCCCCC C
11122224444B4B44B4B D2D2D2D2 3830101010101013939 7D7DFFF CCCCCCCCCCCCCCCCCC CCCCCC
D24D2DB2D4AB4      :REM*176      F7C7C38381010      :REM*233      CCCCCCCCCCCCCC      :REM*44
131 DATA B54B2D2DD2D2B4B44B4B 4 143 DATA 1010101093937D7FFF 0 155 DATA CCCC8F8F8F8F7777F8F8 F
B4BB4B42D2DD2D2A185 43C2A66 10111111010101013939 5555939 8F8F8F877778F8F8F8F 8F8F777
51C381818381C      :REM*101      3101010101111      :REM*138      7F8F8F8F8F8F8      :REM*80
132 DATA 65A6C243C423624635AC 1 144 DATA 10103838444483831111 0 156 DATA 77778F8F000010101010 5
8181C38A66543C2A185 2C345A5 101FFFF8888FFFF8888 FFFF888 454BABA101010100000 0000010
AB18D6186C183      :REM*164      8FFF8888FFFF      :REM*234      0010005400BA0      :REM*96
133 DATA 418221841FF81FF82184 4 145 DATA 8888FFFF8888FFFF8888 F 157 DATA 0100010000000000002020 A
182C1836186B18D5A5A 2C34494 88888881F1F8E8E4444 E8E8F1F 8A87070202020202020 0000000
9949422224141      :REM*207      1E2E244442E2E      :REM*159      0010145458383      :REM*158
134 DATA 88884141222294944949 2 146 DATA 1F1F8E8E4444E8E8F1F1 E 158 DATA 01010101010100001111 8
2221414888814142222 4949949 2E244442E2EB1B13030 03031B1 8884444222211118888 4444222
4404040404040      :REM*171      BD8D8C0C0C0C0C      :REM*14      2111188884444      :REM*181
135 DATA A0A011110A0A04040404 0 147 DATA 8D8DB1B13030303031B1B D 159 DATA 22221111888844442222 3
40404040404040A1111 A0A0404 8D8C0C0C0C0C8D8DFFFF 8080808 333FFF3033FFF33333 F3FF330
0404039394444      :REM*228      080808080808      :REM*103      0F3FF3333FFF3      :REM*45
136 DATA 8282101010101010101 4 148 DATA 08080808FFFFF808080808 8 160 DATA 0033FFF33333F3FF330 F
4443939444482820101 0101010 080FFFF080808080808 AAAAAAA 3FFFAAF0AA8FAAF0AA8 FFFFA80
18282444FEFE      :REM*51      AAAAAAAAAAAAAA      :REM*149      AAF0AA811118A84444 8A8A111
C2C2CEFEF0000      :REM*226      A5555AAAA5555      :REM*230      1232345458989      :REM*225
138 DATA 00000000000000000000 0 150 DATA AAAA5555AAAA5555AAAA 5 162 DATA 1111A2A244442A2A1111 9
000000000000000000 0000000 555AAAA5555AAAA5555 AAAA555 89854543232FFE30222 0222022
0000000000000      :REM*14      5FFF0000FFFF      :REM*66      2FE3F22202220      :REM*136
139 DATA 0000FFFFFFFFFFF0000 F 151 DATA 0000FFFF0000FFFF0000 F 163 DATA 2220E3FF22022202202 3
FFFFFFFFFFF0000 FFFF0000 FFF0000FFFF0000FFFF 0000FFF FFE2022202220221111 FFFF404
FFFFFFFFFFF0000      :REM*162      F0000CCCC3333      :REM*217      04040FFFF0404      :REM*72
140 DATA FFFFFFFF3030FC0030F00 0 152 DATA CCCC3333CCCC3333CCCC 3 164 DATA 0404FFFF40404040FFFF 0
FC00303030FC0030F00FC 3030FC0 333CCCC3333CCCC3333 CCCC333 4040404FFFF1111111 00FF00F
03F0000FC003030      :REM*112      3CCCC33338080      :REM*13      F00FF00FF00FF      :REM*213
141 DATA C00F003000F00C0C3333 0 153 DATA 01010202040408081C10 2 165 DATA 00FF006000080      :REM*77
C0C3333C0C0C33330C0C 3333C0C 22041C0808001010202 0404080 166 DATA -1      :REM*20

```

Listing 4. File Creator program.

```

0 REM OB.RP FILE CREATOR      :REM*140      E24AD880C85201005F0 0920444
:REM*231      520CF244CF911      :REM*225
5 OPEN 8,8,8,"OB.RP,P,W" :REM*0      DATA 2C960C100320EB3B20D2 2
10 READ A$:IF A$="-1" THEN CLOS 85 L=VAL(L$):IF L$>"9" THEN L=A 420411220BD13A2008E 9D0C8E8
EB:END      :REM*78      SC(L$)-55      :REM*84      10C8E870C865A      :REM*206
15 IF LEN(A$)<62 THEN 55      90 BY=H*16+L:PRINT#8,CHR$(BY); 110 DATA 8E9F0CE88667ADD5148D 2
:REM*254      95 NEXT:GOTO 10      :REM*148      0DDA2BAA0224C4B1B24 2C10096
20 B$=MID$(A$,1,20)+MID$(A$,22, 100 REM OB.RP HEX DATA :REM*107      88D00FF68A868      :REM*17
20)+MID$(A$,43,20) :REM*242      100 REM OB.RP HEX DATA :REM*107      111 DATA AA6840A917A0F7A23FD0 1
25 FOR I=1 TO 30      :REM*181      101 DATA 0011A200A083ADFCFFC9 E 6A9808523A971A024A2 18D00AA
30 CS=MID$(B$, (I*2)-1,2):H$=LEF 2F004A280A087862C8C 7621A90 9008523A959A0      :REM*249
TS$(C$,1):L$=RIGHT$(C$,1) 020B714A92B8D      :REM*130      112 DATA 24A20C8D5F128C60128E 6
:REM*209      102 DATA 11D0A908206014A90920 6 31220BF18805B800000 20CC175
35 H=VAL(H$):IF H$>"9" THEN H=A 01420411220BF18000C 5801002 924C05B0C0020      :REM*47
SC(H$)-55      :REM*85      0CC1784120B00      :REM*135      DATA CC176524805B0C0020BF 1
40 L=VAL(L$):IF L$>"9" THEN L=A 103 DATA 1F0078AD14038D9515AD 1 8F85F04006EEEF85FA9 008DFE5
SC(L$)-55      :REM*136      5038D9615A92A8D1403 A9158D1 FA9608DFF5F60      :REM*141
45 BY=H*16+L:PRINT#8,CHR$(BY); 503A91F8D1803      :REM*181      114 DATA B70095000000000008000 0
:REM*67      104 DATA A9128D190358A9018D2C 8 0000000180057012DFE 0000020
50 NEXT:GOTO 10      :REM*115      0208037AD2C808D21D0 2032142 000004001C800      :REM*114
55 IF LEN(A$)<21 THEN B$=A$:GOT 07413203D3F2C      :REM*159      115 DATA 400F0F0A0E0E0D0DB7 9
O 70      :REM*184      105 DATA 870C1005AD880C8520A9 0 500000000000000000 0000000
60 IF LEN(A$)<42 THEN B$=LEFT$( 08D870C8D960C8D9F0C 8D810C2 000003BFFAAAA      :REM*130
A$,20)+RIGHT$(A$, (LEN(A$)-21 0CF2420EF18AD      :REM*12      116 DATA 01C80078AAAA00000020 C
)):GOTO 70      :REM*176      F1290FB6020253A900C 18900FA
65 B$=LEFT$(A$,20)+MID$(A$,22,2 1200114C985D00320B0 15C986D 9FE2CA92DC50D      :REM*195
0)+RIGHT$(A$, LEN(A$)-42) 00320B615D0ED      :REM*70      117 DATA D0187820EC129004A900 8
:REM*140      107 DATA 2C810C100DAD000C3008 2 5145860A9202414F006 2413300
70 FOR I=1 TO LEN(B$)/2:REM*221 0671CA9008D810C2032 1420741 23860186078A9      :REM*152
75 C$=MID$(B$, (I*2)-1,2):H$=LEF 3203D3F2C810C      :REM*40      118 DATA 20241400F7241330F110 F
TS$(C$,1):L$=RIGHT$(C$,1) 108 DATA 3016A9702C870C100A20 B 120BF1800093F000020 CC17592

```


RUN PAINT

400090C00A924	:REM*74	6000C100E000A	:REM*34	5D00648A93F48	:REM*222
119 DATA 8DF807A993204514A999 2		142 DATA 0200000000FF01FF0100 0		165 DATA A930242C300378850168 8	
04514A9008D20D08D21 D0AD00D		1010001FF01FF00FFF0 000000F		D00FF686020BF180060 401F00A	
D09038D00DDA9	:REM*14	D03FD03000303	:REM*109	D2C808D21D08D	:REM*195
120 DATA 178D18D0A91B8D11D0A9 C		143 DATA 0003FD03FD00FDFD2013 1		166 DATA B3180DD7148DAB1820BF 1	
88D16D0242C1006A501 29FB850		7AD00DCDD0DCDF829 0FA8B9B		8005CE8030020B51800 D8E8030	
160AD00DD29FC	:REM*162	E15D0028517A8	:REM*190	060A93E854720	:REM*211
121 DATA 09028D00DD78A01DB9AB 1		144 DATA A517C90FB00FE617A905 C		167 DATA 72184CC618A93F854720 7	
2C9AAF0039900D08810 F35860A		00BE617BECE15	:REM*212	A18A005A245204018A5 454CD61	
9008D810C1008	:REM*106	145 DATA B9CF154C3216BEE015B9 E		886418442A241	:REM*237
122 DATA AD20D0490F8D20D02051 1		115242410016018650D C916B00		168 DATA 8EB902A000C443D004C6 4	
3AD2C80207F1C242930 21A9E0A		2A9FEA41DC51D	:REM*95	4300A202F18C8D0F2E6 42D0EE4	
01320D013AD16	:REM*145	146 DATA 9008A41EC51E9003F001 9		8A90E8D00FF24	:REM*222
123 DATA D029EF8D16D0A9408529 8		8850D8A851818650B85 0BA9002		169 DATA 2C3004A9368501685860 A	
D2B80242C1006A50109 0485016		4181002A9FF65	:REM*38	E05D04C0F19A208E000 D0028A6	
0A9E5A01320D0	:REM*121	147 DATA 0C850CA619A41AE40B98 E		0CA86358534A9	:REM*109
124 DATA 13AD16D009108D16D0A9 8		50CB00BA61BA41CE40B 98E0CB		170 DATA 0018A209D00490026535 6	
0D0DD20CC1792121900 0600608		004860B840CA5	:REM*229	A6634CAD0F6AAA53460 A901CA3	
50B860C840D4C	:REM*26	148 DATA 0B38E9182423100229F8 8		0040A4C2A1960	:REM*88
125 DATA 7F168DD9138CDA1320CC 1		50FA50CE9008510A50F 1869188		171 DATA 843485358636A9008537 A	
7E013A10C0500603F01 07F9019		D00D0AD10D029	:REM*191	9008539A01006342635 2A26394	
F0003FD038506	:REM*14	149 DATA FE050C8D10D0A50D38E9 3		8C536A539E537	:REM*163
126 DATA 8607840808688505A90E 8		22423100229F8851118 69328D0		172 DATA 9008853968E53648E634 6	
D00FF8DDE02A90F8502 6020EA1		1D060201317AD	:REM*81	888D0E48538A53460A9 008539A	
3A9E4A2FF242C	:REM*220	150 DATA 00DC293F09808D00DCA2 6		0114639A66635	:REM*126
127 DATA 300D8503860420EF1820 2		6EAEAEACAD0FAAD1AD4 ACDB142		173 DATA 6634900B18653648A537 6	
0144603008504860320 CD02A50		0F0168CDB1418	:REM*6	53985396888D0E98538 A535A43	
548A607A50628	:REM*190	151 DATA 49FF690148AD19D4ACDA 1		46048A55E8537	:REM*112
128 DATA 6020EA13A9CCA2FFD0D6 2		420F0168CDA14AA684C 3216841		174 DATA 688DC90C98488AA43799 C	
02914A97F20EA13A9C3 A2FFD0C		5851638E51529	:REM*130	A0C6899C90C88D0FA60 863B853	
8204314A90D20	:REM*250	152 DATA 7FC940B064A4AF00FD0 0		CA000B13B0829	:REM*114
129 DATA EA13A9D2A2FFD0BA20EA 1		A09C0C9FFF007386A38 6AA4166		175 DATA 7F99CA0CC82810F460A9 2	
3A9BAA2FFD0B120EA13 A9BDA2F		0A90060AD0DC	:REM*124	4A225A0002087192465 5002302	
FD0A8AAA00F20	:REM*139	153 DATA 2910CDD914F00E8DD914 0		AA56318690585	:REM*77
130 DATA 4E14A900205714201D29 2		A0A0A8513A514092085 1460A90		176 DATA 639002E664B163AAC8B1 6	
0EA13A9C0A2FFD09124 2C30016		02CA90F851760	:REM*168	320A019246530128437 A92599C	
020EA13A968A2	:REM*2	154 DATA 297FC94090020980C920 B		A0CA548C55BF0	:REM*209
131 DATA FFD083A000A2051820EA 1		00209406029FF100529 7F09406		177 DATA 05C637203B1AE637207C 1	
3A9FA2FFD0F020EA13 A9CA2F		0C9609003295F	:REM*127	7A437A536914CA900CD 2C80D00	
FD0E720EA13A9	:REM*7	155 DATA 60293F60A048B9000029 F		2A901914E8810	:REM*73
132 DATA C6A2FFD0DE20EA13A9D5 A		88552B901008553B902 004A4A2		178 DATA EE205617A0FF8444E644 A	
2FFD0D520EA13A9D8A2 FFD0CC2		9FEA818B9FC34	:REM*232	444C437F003900160B9 C90CA8A	
0EA13A990A2FF	:REM*247	156 DATA 65528552A55379FD3485 5		9F1A2228655A2	:REM*133
133 DATA D0C304000707000808FF 4		360A048B901004AB900 006A4A4		179 DATA 0820B117A0007B1542429 1	
E00D000D80515050101 0101020		A48B902004A4A	:REM*253	00249AA91528810F320 451A4C0	
0100080100909	:REM*21	157 DATA 29FEA86818792E35854C B		C1A20CC17CA0C	:REM*201
134 DATA 08080800000000000000 0		92F356900854DA54D29 0309D88		180 DATA C90C270060A908186552 8	
0000000000000000700010 0000000		54FA54C854E06	:REM*190	5529002E65360A55B85 48A55C8	
0000000000000	:REM*96	158 DATA 8655A0C0C8554982008 1		549A90818654A	:REM*41
135 DATA 00000000002000F8FF00 0		918655485548A655585 5560A00		181 DATA 854A60A9202465D00D20 8	
0F0FF00000000010E00 0204171		6A2442040184C	:REM*246	51AB008205617A65ECA 1001602	
424303A595445	:REM*227	159 DATA E517A93F85478546A006 2		0451AA007B152	:REM*14
136 DATA 0010026E001B00FF414E 4		CA004A244204018207A 184CE51		182 DATA 49FF91528810F730ECA5 4	
43242595445000E242C 1013AD1		7207218A02BB9	:REM*213	A38E908C55D9008690F C562B00	
1D0297F8D11D0	:REM*187	160 DATA F3179900028810F74C00 0		218603860A558	:REM*112
137 DATA A9FF8D12D0AD19D08D19 D		2A000C443D00CC64410 08A90E8		183 DATA 8563A5598564A005B158 9	
02422304FC62220F215 20D7129		D00FF4CEF18A6	:REM*122	95B009948008810F5A5 5E20061	
006A066A911D0	:REM*19	161 DATA 468E00FFB13FA6478E00 F		91869109001E8	:REM*243
138 DATA 0920DA129018A911A0B2 7		F9141C8D0DFE640E642 D0D9F0D		184 DATA 18655B85608A655C8561 4	
8A2FF9A489848A93248 4848482		F242C3003B13F	:REM*128	55F8565291F855F8566 A900856	
42C1003A90E48	:REM*38	162 DATA 60A93F8DAA02A6464CA2 0		8A91EA220A01F	:REM*45
139 DATA A5240D120C3013C621D0 0		2242C3003914160A241 8EB902A		185 DATA 20871920EC1920511AD0 0	
FA9028521EE27D0AD27 D029072		6474CAF026885	:REM*232	72465100320511A20B3 1924653	
09715A980852B	:REM*152	163 DATA 3B68853C68853D68853E 9		023A437C8980A	:REM*213
140 DATA A90085224C31EA8D27D0 8		848B13D9500CA88D0F8 68A8186		186 DATA 00A18654885489002E6 4	
D28D08D29D08D2AD060 20B0154		53DAAA900653E	:REM*103	9A66838E9049DB30CA5 49E9009	
C2B1B20B6154C	:REM*36	164 DATA 488A48A53C48A53B4860 4		DB40CE8E88668	:REM*77
141 DATA 2B1BA0F2A915D004A0B8 A		8A90F48A932D00E48A9 3E48A93		187 DATA C666D0CB20511AA921A2 2	
916788C48158D491558 6008040				3A02220871920EC1920 591A856	

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188	260A658A459A9 :REM*152 DATA 08567F0168631A65AA5 5 89DAB0CA5599DAC0CE8 E8865A8 667A631865884 :REM*204	211	D80241E571D00 :REM*197 DATA B23B6D1D80011E771D80 F 31D831D80FA1D080068 24E3F74 608007024E4E7 :REM*168	234	40C8512090708 :REM*249 DATA 94140F90020F14140F8D 1 3031205050E00159013 0312050 50E00040F178E :REM*93
189	DATA 59A9008523A65ABDA312 A C2C80D0020910853620 981AA92 02465500BD006 :REM*141	212	DATA 460800600986921D00C3 4 7991D00C047A01D00AA 47A71D0 0AD47AE1D00B0 :REM*45	235	DATA 130F0C0984060C011388 1 2050314010E970C8513 050C050 314001012090E :REM*132
190	DATA 20FA374C751B20D945A5 6 7F009A55D18693EA820 CB13246 5102120611A24 :REM*95	213	DATA 47B51D00B34708005009 8 3901C005A478D1C0054 47931C0 0604708002807 :REM*255	236	DATA 14059203028D0510130F 8 E10120F171209140592 8800180 D8A3F20805721 :REM*239
191	DATA 65101AA511C54A9008A5 4 A6906C511B00C20611A A51129F 8854A4C821B20 :REM*50	214	DATA D0D147031594030F1099 1 0011314850512011385 0000060 C091000980000 :REM*213	237	DATA 2F2080A9213B20807221 4 520007A375120007737 5B20801 B216020003437 :REM*93
192	DATA 2F17A511C562B018C55D 9 014A50FC55BA510E55C 900AA50 FC560A510E561 :REM*69	215	DATA 060C0910009900001216 9 30000030F1605922000 1809883 F1E001942421E :REM*86	238	DATA 6420809A216A200000728 7 1200021289000500F87 F01E00B F2E022009E2E :REM*124
193	DATA 90034C3F1C20E01290B9 A 908854320611AA90120 5542C64 3D0F424651007 :REM*1	216	DATA 000D42461E0099434B1E 0 02742501E00B644581E 00BC446 01E00B044651E :REM*57	239	DATA BC20004E2EB41C0006B39 B 91C005539BF1C0004939 C520804 3219800900F83 :REM*192
194	DATA 20851AB0A0901AA200E4 6 8B04EA50FDDDB30CA510 FDB40CE 8E8B0EE8A4A85 :REM*214	217	DATA D00AA44010C1405120003 0 F0C0F9217011388060C 0F0F840 612050508010E :REM*188	240	DATA D320008939D620000F839 D B200083399000281283 B220806 B21B720003F39 :REM*103
195	DATA 31D00EA54A38E55D4A4A 4 A8531246570260A0A65 316920A 8B15808C8B158 :REM*141	218	DATA 840C0900059312011993 1 3101201990512011305 9205040 9940500C0C0910 :REM*102	241	DATA A31C007139980003807D0 3 6399000380C87862000 47378A2 0004A37902000 :REM*154
196	DATA AAC8B15828F004A84C35 1 B8E371C8D381CA6318E AA0C4C9 F11A004A900F0 :REM*193	219	DATA 1385020F98100918058C 0 2121513881001141405 128E060 F0E9403011284 :REM*220	242	DATA 4D379520005B37982000 5 F379E20006337A72000 6F37900 0600982792000 :REM*59
197	DATA DDA65AF01E2465500320 6 71C20A324A65ABCAA0C BDA90CC ACA865AAAA900 :REM*177	220	DATA 13031205058E0C090708 9 40D050409158D080501 1699400 0180C8C991E80 :REM*80	243	DATA A415812000AA15900030 0 7D0D0370C0F01841301 1685030 F0DD0D10E8413 :REM*242
198	DATA 85674C4B1B20CF244C66 1 1AD21D0290FCD2C80F0 0848208 83868207F1C60 :REM*41	221	DATA 5B1FA41E80911FA81E80 9 81FAD1E004C3AB51E00 EE39BA1 E00A539BE1E00 :REM*234	244	DATA 0514000405160090385B0 0 0180B84021804422B4 2180762 2B82100BC29BF :REM*232
199	DATA AD21D0290F8D2C808D21 D 00A0A0A0A8DD6146000 0099000 0980000189900 :REM*57	222	DATA 471FC31E00423AC91E80 7 81FCD1E00AF35D41E00 7435D51 C004F39480058 :REM*171	245	DATA 2180EF211B0005090708 9 400000E090E85B80040 0982E22 100A429E92100 :REM*199
200	DATA 001205060C050314000F 8 E000003011204001205 1314120 9031405840000 :REM*166	223	DATA 0883F61E002A3AFB1E00 2 A3A011F002A3A480020 0882EC1 E806A1FF01E80 :REM*126	246	DATA AA29060F0E9410010785 1 3080110851001141405 120E930 2121513080593 :REM*91
201	DATA 12169300000409138B00 0 0040506090E851B0001 0606050 31400030F0C0F :REM*66	224	DATA 711F50003007D03F4C50 0 03807D0CD4C48006808 84D71E0 09D48DC1E0017 :REM*213	247	DATA 0D0F0E0F0308120F0D85 0 8091205130013031205 058E0D0 5041205130017 :REM*231
202	DATA 920000130F0C09841B00 0 E0F120D018C0000040F 15020C8 5000011150104 :REM*146	225	DATA 48E11E002D48E81E00FB 4 748003007D0313A4800 3807D05 F3D060F0E9417 :REM*25	248	DATA 031205058E1514090C09 1 499B800280E89FE2100 402A022 200492A062200 :REM*3
203	DATA 1215100C851B000E0F12 0 D018C0000040F15020C 8500001 1150104121510 :REM*181	226	DATA 09041488080509070894 0 000000000000000000 0080071 2011008090393 :REM*198	249	DATA 462A0B2200432A132200 4 C2A1A2200372A242200 3D2A302 2003A2A3D2200 :REM*177
204	DATA 0C851B00030F16059200 0 012169300000F920000 010E840 000180F924F57 :REM*173	227	DATA 1405189468001807889F 1 F80F31FA31F800720A8 1F801B2 0121D000224D19 :REM*172	250	DATA 302AB800300E88FE2100 7 B2B022200A22B062200 9F2B0B2 200932B132200 :REM*47
205	DATA 5F6A727A858C91959A13 0 50C05031400030F0C0F 921B001 513050010058E :REM*168	228	DATA 1D00224D1E1D00224D22 1 D00224D271D00224D70 00280D8 3AE1F003E4DBA :REM*221	251	DATA 6E2B1A2200AA2B242200 A 72B302200AD2B10058E 0412019 7141910850D0F :REM*68
206	DATA 00001513050002121513 8 80D0F1605000D091212 0F92130 514001205060C :REM*195	229	DATA 1F003E4DC21F003E4D70 0 0300C83DC1C00EE4CE4 1C00EE4 CEC1C00EE4C70 :REM*178	252	DATA 04850409138B9D9CA6A7 0 00000250AA32280BC1D 0622806 C1EA62280061F :REM*231
207	DATA 05039413050C05031400 1 0058E13050C05031400 0212151 38813050C0503 :REM*84	230	DATA 00380C83F71C00084DFF 1 C00084D071D00084D13 0312050 50E00030F0C0F :REM*255	253	DATA AA2280C61FAE2280E420 B 22280C921B622003A26 B72200F 525B822002226 :REM*199
208	DATA 14001001141405128E80 0 0002B2B2B2BAB000022 222222A 200002C2C2C2C :REM*82	231	DATA 92070F148F03151213F 9 2030C05011200130312 05058E0 30C0501120010 :REM*77	254	DATA B922004826000000000 0 0000003F033F333F00 0030303 F33333F000000 :REM*126
209	DATA AC000028282828A80000 2 9292929A900002A002A 00AA000 0180F8A371D08 :REM*192	232	DATA 0107851012090E941115 0 9940405160903851B00 0809120 59300000D0504 :REM*102	255	DATA 3F303030303030303030 3 3333F0000003F3333F30 3F00000 F0C3F0C0C0C0C :REM*163
210	DATA 381E431D0098474C1D00 9 247C71C00E747971C00 7547621	233	DATA 1205930A0F1913140903 8 B0D0F1513850C050694 0D09040	256	DATA 00003F33333F00303030 3 03F33333300000C000C 0C0C0C0

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257	DATA 0000300030303 :REM*251	110EE60A52C10 :REM*2	6900BAD860CC9 :REM*210
	033F0030303333C333300 0	280 DATA 22A52038E901B002A900 2	303 DATA 1CB011690E90AFA54118 6
	00C0C0C0C0C0C00000 333F3F3	0072690EE85202C851F 20CF24A	928854190B9E642D0B5 2032142
	3330000003F33 :REM*72	5133006C90DF0 :REM*1	08A2620C912A5 :REM*246
258	DATA 3333330000003F333333 3	281 DATA 0218606868A90085674C 2	304 DATA 11C91890574A4A4A228 2
	F0000003F33333F3030 00003F3	B1BA52C10F5A9012030 2620072	00819853F8640A900A2 0420494
	3333F03030000 :REM*210	690F2186520C9 :REM*106	7A40FA510A270 :REM*94
259	DATA 3F333030300000003F30 3	282 DATA 4A9002A94A60A51F38E9 0	305 DATA 203219A20E2008192049 4
	F033F00000C3F0C0C0C 0F00000	1B002A900200A2690F2 A51F186	7A00E88302EB13FC920 F0F7984
	0333333333F00 :REM*68	901C9289002A9 :REM*66	8B13F20341799 :REM*86
260	DATA 00003333333333C00000 3	283 DATA 28200A2690F0A2FAB501 4	306 DATA 19158810F568A8C898F0 1
	333333F33000000333F 0C3F330	AB5006A4A4A60AAA003 BD202E9	51869068D2915A213A0 1520571
	000003333333F :REM*38	91515CA8810F6 :REM*30	418A900A2004C :REM*103
261	DATA 033C00003F030C30300 0	284 DATA 60A000AEDC14A97F4C4E 1	307 DATA 77143860A9008531203D 2
	000330C3F0C3300000C 3F3F0C0	44A4A0A48A8B9E2DAA B9EF2DA	9B0077005C531D0F518 60203A2
	C0C0C00C30FF :REM*19	8686020232720 :REM*111	9203D29200114 :REM*109
262	DATA FF300C000000003F3030 3	285 DATA BF183004200020A201A0 0	308 DATA B8900160482490A590C9 8
	F3030000FF0000FF00 000000F	8208914A259A00C863F 8440A00	0900468A905606860A9 538D121
	C0C0C0C0C0 :REM*29	0B13FF0062045 :REM*133	5AC2915A90099 :REM*95
263	DATA 30303F3F000000000000 F	286 DATA 14C8D0F660A90C482085 1	309 DATA 141520AE27A212A01520 A
	FFF0000000C0C0CFCFC 0000003	468A2F5A02C853120A0 268543A	0262043144C2914A938 209B272
	0303030303030 :REM*241	20EA02720A026 :REM*213	023279025C93F :REM*109
264	DATA 300C0C0C0C0C0C0C0C0 0	287 DATA 20CF12B030200114C900 F	310 DATA F00620E1274CF2272040 1
	C0C0C0C3F0C300C0CFF FF0C300	074A443C914F017C90D F01F201	4A217A02DA90120BC26 E059D0E
	0000000000C00 :REM*88	327B0E5C431B0 :REM*8	D203214205329 :REM*81
265	DATA 000000000000F0000000 0	288 DATA E199300C204514E643D0 D	311 DATA 208A263860208D261860 A
	000000FF0000000000 0000FF0	0C0000F0D3204514C643 4CCA26A	91BA208D004A900A209 8EDC148
	000000000000 :REM*46	4438C2F0CA900 :REM*166	DE221491B8DE9 :REM*104
266	DATA AA00000000FF00000000 0	289 DATA 99300CAE300C98601220 9	312 DATA 214C2B1BA904A20E20E4 2
	0CC0000C30000000000 F00000C	29D00C920900AC9A0B0 04C980B	9208514A207A02DA928 20BC26F
	C0000C30000FF :REM*60	00218603860AE :REM*218	00A20AE27A230 :REM*104
267	DATA 0000C300000C300000C300 0	290 DATA DC14209C14B034204429 B	313 DATA A00C2067294CDE274A4A A
	0C300000C300000C30000 FF00000	02FA00020011499590C C8C90DD	8B9E32D8E20C482007 13200E4
	0000028190000 :REM*5	0F5202914A900 :REM*42	EA9808D000CAE :REM*101
268	DATA 00280ACD8FA022C070E B	291 DATA 99590CAD590C290F8531 0	314 DATA 820CB0512DF00620451 E
	E2D800013206140AFA9 008D990	A0A65310A8531AD5A0C 290F653	8D0F568AABD7F2DF006 204514E
	C20CC175B00FA :REM*177	1C91490096020 :REM*232	8D0F520B51800 :REM*248
269	DATA 000500E6FDE6FDE6FEE6 F	292 DATA 2914A9008D590C18602C 5	315 DATA D8E8030D20BF18500428 0
	ED025A9002CA9808D99 0C20CC1	32C57002C502C5700A2 002CA20	040200CC17382D280407 00CE810
	78E24FA000500 :REM*237	5AC2F0CDB6920 :REM*231	C208D3B4C3333 :REM*41
270	DATA 4CE024A9002CA9808D99 0	293 DATA F00799300CC8E8D0F460 2	316 DATA A92348A224D01AA9172C A
	C20CC178924FA000500 2058261	06E14B03D204429B038 60A9002	91F2CA91B2CA9032CA9 072CA90
	8651F8D970CA5 :REM*207	0A514B0306020 :REM*130	F2CA9132CA90B :REM*205
271	DATA FC4A4A4A1865208D980C A	294 DATA AE14B02A60A27F209C14 B	317 DATA 48A20020DE29684820A2 2
	0FA205817A0FA207E17 204A25A	022204429B01D60AEDC 142CA27	8B039200712668484A4A 0AA8B90
	5FD0A0A0A8543 :REM*72	F209314B01120 :REM*255	E2EAAB90F2EA8 :REM*17
272	DATA A9002A854420C7252095 2	295 DATA 4429B00C60204514B006 2	318 DATA C04ED0034C082B6848C9 1
	520C725209525A9D0A2 0720494	04429B00160C903F004 C905D00	FF01E20932720752968 C923F05
	7A542290309D8 :REM*86	3A9002CA98048 :REM*154	EC917F036C91B :REM*178
273	DATA 854220C725A940186552 8	296 DATA 20321468100820232720 8	319 DATA F035C913F03AC90FF054 4
	552A90165538553A928 18654C8	D26F00920CC173F2D30 0412002	CF22786388439208827 2075292
	54C9002E64DEE :REM*202	0C91220321420 :REM*423	0A12720A62C20 :REM*86
274	DATA 980CC6FED0B4AD970C20 0	297 DATA CF24AD2B8852920843B 2	320 DATA D03A203D294820321420 7
	619853F8640AD980CA2 FE38E91	06D132429301A208913 A900A21	C13688D21D08D000C4C 1042209
	9E8E8B0FA6919 :REM*212	B8D71208E6A20 :REM*150	518203214206D :REM*176
275	DATA 8D9B0C8E9A0C0A0AA2A0 2	298 DATA ADA10C8525ADA20C8526 4	321 DATA 134C1042242C10C6A901 2
	00819204947AC9A0CB9 9424AAB	C2B1B20AA13A200A91B D0E4206	01F29207126A931A200 A013206
	99324204947A5 :REM*142	326A92A8D1915 :REM*236	52B4CF2272000 :REM*5
276	DATA 528541A5538542A93F85 4	299 DATA A9248D1215207126A908 A	322 DATA 6C4CF22720CC17006000 D
	7AE9A0CF002A97F8546 60AE9A0	212A015205714201D29 2088272	0471F20BF1847EFD007 0020712
	CBD9B24186D97 :REM*218	0A12790033CCA :REM*96	6A958A247A0EF :REM*181
277	DATA 0C853FBD9C2469008540 A	300 DATA 27203A29B0F870662037 2	323 DATA 20652B4CF22720932720 7
	250AD9B0C2008192049 47A54C8	9202629A9008D860C18 6978854	529A007B9EC2CD9F64E D005881
	541A54D8542A5 :REM*60	1A90469008542 :REM*56	0F5301620CC17 :REM*31
278	DATA FD8543A9008544A90ED0 C	301 DATA A9008D850C203729B0D6 7	324 DATA F64E0060800C20CC1700 6
	22C990C100FA23FA041 20DE25A	044A922202829703D20 3729A00	0FF4E800CA207D003AE FE4E8EC
	546A647854786 :REM*201	0203D29B0C370 :REM*112	114E8E008F000 :REM*111
279	DATA 464CE517A9018531B500 4	302 DATA 31C9220082004317914 C	325 DATA A2208EC414A006B91315 2
	8B90000950068990000 E8C8C63	8D0ED202629EE850CAD 850CC91	04317C91B9002A90099 A81FC8C

RUN PAINT

C291590EBB9A7	:REM*20	E407F407F0001	:REM*146	B20C530203F31	:REM*14
326 DATA 1F098099A71F4CF2278D 1		349 DATA F64E0BFA17F700602B80 0		372 DATA A9088D010CAD020CCD4E 2	
7152093274C752920CC 1717F70		060005CFE5F006C5250 462E525		F90052C4D2F300FA90D 20BF272	
060F402A90BD0	:REM*143	0502E5250422E	:REM*209	C4C2F1005A90A	:REM*9
327 DATA 39ADC114D0034C2B1B8D F		350 DATA 5250532E5250302E5250 4		373 DATA 4CBF2760A53F18690885 3	
42C20CC17EC2CF64E09 00A903D		F2E5250482E52504D2E 5250552		F8D35319005E640EE36 3160A00	
02120CC170BFA	:REM*27	E202020202084	:REM*91	7A20620043109	:REM*179
328 DATA 00608004A9072CA90F2C A		351 DATA 3B4C2B1B2C4F2F30F820 F		374 DATA 8020BF278810F3608A48 1	
9134CB42BA91B2CA917 2CA91F4		92FA927482062422076 43C900F		E006A2C502F10046A4C 13312AC	
820CF246848A2	:REM*184	0E5482C4F2F50	:REM*12	A10F0AA68C907	:REM*160
329 DATA 0720DE29684820632620 B		352 DATA 0C0A0A0A8D802FA9002A 8		375 DATA 8AB0062C502F10014A2C 1	
126F056AC2F0C6848C9 1FD0032		D812F984A4A4AF0CD48 20843BA		30C100249FF60AE010C A000E00	
07627200C2920	:REM*62	25D205A261865	:REM*174	8B00ABD006499	:REM*244
330 DATA CC17300C191510002071 2		353 DATA 208D980CA65BA55C2076 4		376 DATA 006AC8E8D0F260207C31 A	
66848C91FD005A00220 7326684		318651FAA68A86838E9 014CD32		D010CC908900160202B 31A9002	
8207B26863884	:REM*99	EA91348A01924	:REM*245	C130C1002A9FF	:REM*120
331 DATA 39186910207E26C0000F0 5		354 DATA 2C1002A06320C92FB008 6		377 DATA 99006AC8C00790F820F4 3	
BC001F01CC05BD00BAD C114C90		520D0034C2B1BA8A94F A2008E9		0020E230C64410E21860 203F31B	
7D004A2FFA056	:REM*66	80CF014A91748	:REM*175	00320C530A271	:REM*187
332 DATA 207029B0C768C913F01D 4		355 DATA A91920C92FA8F0E8A520 8		378 DATA A02FAD702F4C302FAD02 0	
CF227208827207529B0 B720CF2		D980CA927A61F8C030C 8E970CC		C8544CD4E2FB00EC927 F014A27	
420B22720A62C	:REM*142	D4E2F9003AD4E	:REM*57	EA02FAD7D2F4C	:REM*60
333 DATA AD2C8020BF274CF227A2 3		356 DATA 2F8D020C68A21C20DE29 A		379 DATA A531A268A02FAD672FA C	
120972CA2318E1715A9 01201F2		9008523201D29A90020 5714208		531A25FA02FAD5E2F20 302FA90	
9A9008538A913	:REM*33	62F20B227A252	:REM*212	0853F8D3531A9	:REM*94
334 DATA 8539A260A0FD2070294C F		357 DATA A02FAD512F20302F20CC 3		380 DATA 608540A9648D3631604C F	
22720CC1700D0006047 1FAE056		4A9088D010C204A25A9 808543A		A314C1F320500005040 80031B3	
0E8AC0260C898	:REM*222	902854420DC17	:REM*127	3174B45525242	:REM*97
335 DATA 200819186907488A6960 A		358 DATA 20452FEE980CCE030CD0 E		381 DATA 55460012041B4B4001FF 4	
868AA207029A2589006 20972C4		720482F2032144CF227 863F844		94F4D041B4B80024147 0014021	
CDC2B8E171520	:REM*98	08543F00CA000	:REM*251	B325403FF4C4F	:REM*187
336 DATA CC1747EF0060D007A2D0 A		359 DATA B13F20BF27C8C44390F6 6		382 DATA 4144534156041B4B8002 0	
0674C102CAD1715488E 1715205		04C85304C6A31070000 3C07000		0100283207C31A0007B1 3F99006	
329688D171560	:REM*118	04841524D4F44	:REM*187	A8810F8C8A207	:REM*170
337 DATA A942A21F20C02CA900A2 5		360 DATA 450010020B0C0108FF46 4		383 DATA 20043120BF27C8C00890 F	
C20B82CA900A2D88538 8639A9E		F4E5453490108001002 000CAE0		320E230C64410E14CC5 30A271A	
8A20385438644	:REM*130	0010F48415253	:REM*125	02FAD702F4C30	:REM*91
338 DATA A000C443D005C6441001 6		361 DATA 495A405013020D010802 F		384 DATA 2FA9408D9F0CA9800D9F 0	
0AD820CD00B203D29B0 F591387		F464F4E5441AEC014E0 04F033A		C8D9F0C209D3BA20086 6486662	
0F19005B13820	:REM*173	91020B326D003	:REM*81	0D032A20220D0	:REM*157
339 DATA BF27C8D0DFE639D0DB60 5		362 DATA 4CF22720732720CC1730 0		385 DATA 32A56938E567A56AE568 0	
2504620522E522E0045 4E54455		C15151400AC2F0C200C 29AEC01		8A202B002A200B56749 FF856DB	
22046494C454E	:REM*132	4A002207626AD	:REM*200	56849FF856E86	:REM*254
340 DATA 414D45203F20000444953 4		363 DATA 29152012292088272075 2		386 DATA 71A26920F43228B003A2 6	
B20434F4D4D414E4420 3F20004		9B0EA60AC4B2F207626 4C88273		72CA269B5016A856CB5 006A856	
6494C45204558	:REM*129	82C150C102920	:REM*132	B900AA46C1006	:REM*82
341 DATA 495354532E205245504C 5		364 DATA F92F20253AB0FB20153B 2		387 DATA E66BD002E66C204433E 6	
143452049542028592F 4E29203		0CF3B20183CA9032055 4220183		DD00AE66ED006A9008D 9F0C60A	
F2000053544154	:REM*231	C20CF1290E5A5	:REM*227	67120B132246C	:REM*128
342 DATA 55533A44455649434520 4		365 DATA 4A4820843B684A4A4A18 6		388 DATA 3003A2002CA202E471F0 D	
E4F542050524553454E 544C4F4		0202A2AA98085234CCF 244CFA3		D20B1324C8832B56318 7548954	
1443A20005341	:REM*29	14C1F32050000	:REM*198	8B56475499549	:REM*4
343 DATA 56453A200004449534B20 4		366 DATA 508000041B5431360C4D 0		389 DATA 8A4902AAA56B18756785 6	
34F4D4D414E443A0050 52494E5		1FF44415441061B5330 3332301		BA56C7568856C60A001 9463B55	
43A2000455845	:REM*27	402061B533036	:REM*201	F38F5489567B5	:REM*45
344 DATA 435554453A20000464F4E 5		367 DATA 34305441021B41444550 5		390 DATA 60F549956830071567D0 0	
4005041545445524E00 4252555		448001402180C4C01FF 4441544		2956360A0FF94649463 8A6967A	
3480053484150	:REM*168	142494C85304C	:REM*191	AA90038F500095	:REM*168
345 DATA 450050414745004D4F4E 4		368 DATA 6A310700003C070000FF 4		391 DATA 00A900F5001950160A200 2	
F4348524F4D45205343 5245454		252555348444952464C 4101081		CA202B52538F5489548 B526F54	
E004849524553	:REM*100	4021A0CC101FF	:REM*111	9954960A90118	:REM*18
346 DATA 2053435245454E004D45 4		369 DATA 01084954524947485401 0		392 DATA 654885489002E64960A9 F	
4524553205343524545 4E00555		F520015021B0CBB01FF 4544010		F2CA9FE1865488548B0 02C6496	
4494C49545900	:REM*38	8424F54544F4D	:REM*81	0A01F2CA00072C	:REM*103
347 DATA 52454354414E474C4500 5		370 DATA 42207C31202B3198AAA0 0		393 DATA A003A203B54899DF1488 C	
3435245454E0000050D 13191E3		0E007B009B13F9D006A C8E8D0F		A10F7602C9FC073DA9 0E2C9D0	
03D4B535DF64E	:REM*172	3843120F43020	:REM*154	CF036203333A9	:REM*129
348 DATA 0060006000602B800060 0		371 DATA E230C64410E020CC1700 6		394 DATA 022C9D0CF00920023320 8	
05CFE5F7F5B8064F462 000004DC		000648002A5318D010C C902B00		63320BF36A9042C9D0C F009200	

R U N P A I N T

53320863320BF :REM*5	44B203C45B00F :REM*128	C102220223785 :REM*104
395 DATA 36A9082C9D0CF00C2002 3 320053320863320BF36 20B3349 00160A9202C9F :REM*91	406 DATA A548A4494C2B4520BF18 4 800040000602C334A5 482DA30 C855024291005 :REM*136	417 DATA 35C8D002E6358434A201 2 0D03620FF3620223720 FD36EE2 40CA9034C5536 :REM*232
396 DATA 0CD01B30132CD8141011 2 CA00C100920153320C2 3320213 34CC8334C0B3E :REM*225	407 DATA 0648264908205617A54A 2 90718655285529002E6 53207C1 7242910052866 :REM*184	418 DATA 200E3785348635089005 A 23420F432A20020D036 289005A 23420F432A534 :REM*224
397 DATA 20374410016085320A0A 0 A0A853320CF344CE933 20B3349 0016020CF34AD :REM*253	408 DATA 496648600060640618062 C 063006540668067C068 006A406 B806CC06D006F :REM*7	419 DATA A63520FF36200E3720FF 3 6206236CE260CA902A2 0020FF3 6AD260CC9FFD0 :REM*36
398 DATA D5148532ADD71485332C 9 F0C3048242A500BEE9E 0CAD9E0 C2DD414F03CA0 :REM*171	409 DATA 407080771C07200744075 8 076C0770079407A807B C07C007 E005C285C505C :REM*155	420 DATA 9460A55BA65C186D240C 8 55F9001E88660A55BA6 5C38ED2 40C8548B001CA :REM*63
399 DATA 00AD2C8024293004B14C 2 90F8531C532F0297024 2C1D0C3 01FB14C290FC5 :REM*156	410 DATA 785CA05CC85CF05C185D 4 05D685D905DB85DE05D 085E305 E585E805EA85E :REM*158	421 DATA 8649A55DA65E186D260C 9 001E8209936A55DA65E 38ED260 CB001CA854A85 :REM*54
400 DATA 32F014AAB14E290FC532 F 008E431F007C531D006 A2032CA 2022CA2012CA2 :REM*229	411 DATA D05EF85E205F485F705F 9 85FC05F00FF00008040 2010080 40201C0300C03 :REM*97	422 DATA 61864B86622036332C14 0 C1005202D37F00E2044 33A55F8 548A560854920 :REM*91
401 DATA 00A52A29FC852A8A052A 8 52A8AA8A6502429700D B970353 D6C358551BD6C :REM*113	412 DATA 0055A0FF20703B20B439 2 05D42A56148A55D8561 209D3B2 02D376848C55D :REM*114	423 DATA 4433A0032CA0072CA01F A 203B9DF14954888CA10 F760A90 28543BD220C85 :REM*249
402 DATA 35D00BB960353D643585 5 1BD6435A0002C9F0C10 07A5515 15291526049FF :REM*63	413 DATA F012E65DD002E65E209D 3 BA54AA64B20993630E8 68855D8 561209D3B202D :REM*142	424 DATA 36A90085372063198A49 0 1AABD220C8536A90085 37203C1 98A4901AAC643 :REM*201
403 DATA 315205519152AD1D0C30 3 2A52A302E2903242970 1C2903A AF023E003B01B :REM*188	414 DATA 37F0CB20703B20B43920 5 D424A8A6A8D220C1865 5B855B9 002E65C984A8D :REM*51	425 DATA D0DCA534A63560AA9818 6 D280C8D280C8A6D290C 8D290C6 0A20220243749 :REM*207
404 DATA B14CE002F006290F0533 5 00429F00532914C60C9 01D008A AB850E5A53291 :REM*88	415 DATA 230C18655D855D9002E6 5 E20DB354CB535A9008D 240CAD2 30C8D260C0A49 :REM*152	426 DATA FFAA9849FF1869029001 E 8E08060A200BD240C0A A8A9002 A60A900852A4C :REM*52
405 DATA 4E602903F0FBAE001D0 F 6B14C290F1D0C15914C 00A54AA	416 DATA FF69038D280CA9FF6900 8 D290C2C140C30032062 362C290	427 DATA 3932A91E20554220CF12 9 00620EF186CF042C2B 1BA2002



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428	CA2142CA22886 :REM*162 DATA 1FA520852020CF244C2B 1 BA900F0F4A94AD0F0A5 2038E90 CB002A90004C53 :REM*128	451	43920253AB0FB :REM*89 DATA 20123B202E32202E3220 C 93C20CF1290EAAED414 CABE9E0 C4C3632A9802C :REM*53	474	003B9643548A0 :REM*32 DATA 0068485152915220043F C AD0F4686020FC3B2001 3CA90E2 C9D0CF035A225 :REM*201
429	DATA 37A90C2030264C533720 8 037208D184C9011201D 3AA0082 42C3002A002A2 :REM*90	452	DATA A900852460A511C9C860 2 05D3BA920D020206C3B 2429100 34C2B1B203512 :REM*24	475	DATA A02D20A13B2429100406 2 D262EA20FA0FA20A13B 204C3DA 20220063D204F :REM*188
430	DATA 0188B993249DAE37B99B 2 49DB637CA10F08443A20 C337AD2 C800DD7148DBA :REM*138	453	DATA A900F01C20703B203512 A 940D01220703BA98048 20D4392 CD8143003202D :REM*52	476	DATA 3DA20620063DA20FA0FA 2 0A13B204F3DA2042006 3D60A5F AC940A5FBE901 :REM*60
431	DATA 3720C618CD8F803E0020 C 6182D80A00F00A43AD0 CC20203 A60A93FC000F00 :REM*139	454	DATA 12688DA80CA9008D9F0C 2 0003B20943B20C93C20 253AB0F 220123B208C3A :REM*166	477	DATA B029A5FCC9C8B0231869 3 29D01D0A5FA1869189D 00D0A5F B6900088A4AAA :REM*184
432	DATA 02A97F8546854760AD21 D 0290F8544CA8E21D024 2C30188 D62388E643820 :REM*80	455	DATA 241310EB30E620153B20 4 433ADCD144C5542202F 17A9202 CA80CD0EA1007 :REM*1	478	DATA BD483D28F00D0D10D08D 1 0D060A9FA9D01D06049 FF2D10D 08D10D0600102 :REM*69
433	DATA CC175E386900070020F1 3 8005C005CE8034C2B1B A05B207 E17A90008531A9 :REM*210	456	DATA A900852A4C363220153B 2 0B334001320CF342CA8 0C700CA 000B14C29F00D :REM*181	479	DATA 0408A2002CA202B52D38 F 50F95FAB52EF51095FB 6020543 B20FA3AA90085 :REM*114
434	DATA 2818654C854C9002E64D A 003A202A531914CC8CA 10F8A91 1186531853190 :REM*33	457	DATA A9C914C60A007A90091 5 28810FBC8AD2C80914E 0DD7149 14C6020CC34A9 :REM*198	480	DATA 2A8DA00C2002458579CD D 514F0EC20FD3DD0E7A4 4AA200F 014A678F0DDCA :REM*67
435	DATA E0A55BA45DC9080008C9 4 8D00AC038D006AED514 4C4438C 990F00160AD21 :REM*240	458	DATA E88543A9038544A007A9 0 011528810FBC900D003 20C43A2 0451A202E4CC6 :REM*48	481	DATA BC0004CABD00048549CA B D00048548867888844A E64A20F D3DF0F9C64A20 :REM*49
436	DATA D0290FAAE88A0A0A0A18 6 55D854AA9018537A924 A200A01 B208D194CEC19 :REM*231	459	DATA 43D0E6C64410E260A048 2 CA05B2CA05F984820C9 3C68A82 0CF1290F42CA0 :REM*225	482	DATA 153320CB3D20243320CB 3 D20153320C233C64A20 FD3DD0C 520153320F13D :REM*24
437	DATA C080800F00F000C08080 F 0000F00A54CA64D8DEA 388DEC3 88EEB388EED38 :REM*224	460	DATA 252CA05F2CA04878A60F A 510242910064A488A6A AA68960 0990100A90099 :REM*85	483	DATA 20243320F13D4CAF3D20 F D3DD01FA678E0FC9005 68684C6 23DA5489D0004 :REM*233
438	DATA 60A9E8A2038DEE388EEF 3 860201D3AA9A0A20F20 8138A00 8242C3002A002 :REM*126	461	DATA 0300A5119902005860BD C 0148D0B0CBDC3148D0C 0C8A0AA ABDC5148D0D0C :REM*56	484	DATA E8A5499D0004E8A54A9D 0 004E886781860E64A20 FD3D08C 64A28D0CF6020 :REM*245
439	DATA A20188B99B249DEA389D E C38CA10F3843A20C337 AD21D02 90FAAAD2C8020 :REM*175	462	DATA BDC6148D0E0CD01C20D7 4 74C703B0F0502BD593B 8DCD14D 00BCA8E1E0C4C :REM*87	485	DATA B3349003A9FF60200245 C 57960A54A290F85310A 0A18653 1857720CF3420 :REM*77
440	DATA CB38AED714ADD61420CE 3 8A43AD0D32030A60A0 002CA00 7488A48A200B9 :REM*38	463	DATA 703BCA8EA90CAD371C18 6 9038D9D11AD381C6900 8D9E114 CCF2420BF36A2 :REM*133	486	DATA 3033ACEE14A9C838E54A C DCE14B001AA86742021 3F29078 5750AA8B92D3F :REM*123
441	DATA 5E389569C8E8E00790F5 6 8AA68856D866F20F138 2D802D8 0A00F60A006A2 :REM*61	464	DATA 48A00BD014A20BD00EA2 4 82CA25FA05BD007A25F 2CA25BA 0488EA73BA200 :REM*190	487	DATA 8D8E3E8D993EB92E3F8D 8 F3E8D9A3EA017A93F38 E548AAA 901E549D006E0 :REM*73
442	DATA 44204018A000C443D007 C 64410034CEF18201E18 2469500 B1002256CC56D :REM*52	465	DATA B5009900000E8C8E0049 F 56020CF2420E03BA025 20173BA 001A200162536 :REM*71	488	DATA 17B0028AA8981865754A 4 A4A8576A9008D1C0CAD D714853 3A548290FC908 :REM*180
443	DATA D016201E18246A100225 6 E246B1002056F500245 70202F1 8C8D0CDE640E6 :REM*41	466	DATA 26E8E88810F74C901185 4 AA90085488549ADA10C 855FADA 20C8560602025 :REM*106	489	DATA 9002E677A5771869408D 9 C3EA90969089D9D3EA0 00A200B DC90CF02849F :REM*251
444	DATA 42D0C74CEF1878CA8A20 9 715A9802CA900788D12 0C584C2 B1BA232A005D0 :REM*32	467	DATA 3AB0FB20C33C20CF1290 F 360A9002CA980788D96 0C209D3 BB00AA0542017 :REM*94	490	DATA 31529152BDC90C3D0005 1 1529152AD1C0CD0132C 1D0C300 E98488A48A8A2 :REM*96
445	DATA 26A248A004D020A22CAC D C14A904CDD014F002A0 048CC01 4C0044C7D39A2 :REM*76	468	DATA 3BA254209F3BA54A48A9 0 0854AA9C7856120983C 6820CD3 BA9002CA98085 :REM*28	491	DATA 01208033468AA68A89818 6 908A8E8E47690C9F0C7 AD8E3E1 869048D8E3E8D :REM*62
446	DATA 27A003D004A216A001A9 8 059100C99100C208047 4C2B1BA 003A23D000AA0 :REM*177	469	DATA 4020CF34A20020D032A2 F FA5502429100B244030 02A2550 A066726688632 :REM*57	492	DATA 993E9006EE8F3EE9A3E 2 0043FAD1C0CD00BA54C 1869288 54C9002E64DA5 :REM*239
447	DATA 44A230D004A0B9A2318C 9 C398E9D3920CC174430 452F410 04C2B1B20703B :REM*73	470	DATA A8B9B841253248984907 A 8C88431A56738E53185 67A568E 90090234AA567 :REM*207	493	DATA 77186905C9509002E950 8 577C674F0034C7A3E4C C236E65 2D002E653A552 :REM*98
448	DATA 20D43920FD3A20FD394C A E392CD814301B2C140C 101620B F18190D3F0000 :REM*109	471	DATA 6A4A4AAA68A8A532489 6 000F002684824401002 3152515 2915220451ACA :REM*193	494	DATA 85486000055405A805FC 0 55006A406F8064C07A9 0018209 846A9001820C7 :REM*203
449	DATA A98024291002A9C08D19 0 D20493FAD90C291FAC 971CD00 2A9008D9D0C09 :REM*78	472	DATA 10EEA55F2DA30C242910 0 10AAA683DC141A00024 4010023 1525152915218 :REM*203	495	DATA 4620AB3F20BF180005A0 0 200A9008D743F8D843F A9058D7
450	DATA 018D15D0AD110C852360 2 0703B20D43920FD3A20 FD394CF	473	DATA 586020CF34A56138E54A 9 0F5AAE8A450B96C3529 5524293	496	

RUN PAINT

53F8D853FA907	:REM*89	582A000A200A9	:REM*0	F186901657285	:REM*244
497 DATA 8550A000A9038543A201 B		508 DATA C0248108B17285838484 A		519 DATA 72900FE67360A907C818 6	
9190D9D0005E8C8C643 D0F4984		48084852808F029A47F A900068		55285529002E6536020 CF24209	
8A450A203183E	:REM*69	32A88D0FAA824	:REM*159	A42203C424C90	:REM*158
498 DATA 0005CA10FA8810F4AD74 3		509 DATA 29100E28083005B9DC41 7		520 DATA 1120CF24209A42203542 2	
F1869048D743F8D843F 9006EE7		011B9F041500C280830 05B9CC4		0D03A300EF20703B205D 4220354	
53FEE853F68A8	:REM*80	17003B9EC419D	:REM*230	220D03A30F520	:REM*147
499 DATA C03F90C4C65010BE60A9 1		510 DATA C90CE8E028B00DC685D0 C		521 DATA 3F42A9803005203F42A9 0	
68DCE14A03FCECE14D0 04EECE1		BA484C8C47D90B6F0B4 68A57D2		08540209D3B201F3CE6 4AA54AC	
460A203A90088	:REM*231	0F441A4758830	:REM*244	56190F5F0F3A9	:REM*156
500 DATA 19190DCAD0F9C900F0E8 6		511 DATA 13A2001808287EC90C08 E		522 DATA 061865A2C5A2D0FC60AD 1	
0AE487F24291005E88A 0AAACA8		8E47690F6F0F468B0EA A476A68		10C852320E03B200F3B 20F13B2	
E1015AD4A7F8D	:REM*44	8BD941117891	:REM*223	0E03B200EE3B20	:REM*9
501 DATA 1115A9028DA60C8DA70C A		512 DATA 783DB94151789178A950 2		523 DATA 123B206543B00AA25BA0 5	
24FA07FA90886728473 857EA9C		47E08F010ADF10C0DC9 0C8DC90		F20DE25206543488A48 207043B	
98578A90C8579	:REM*140	CB9F10C117891	:REM*24	00AA25DA06120	:REM*213
502 DATA 20CF34A900857BAE1015 E		513 DATA 7828700BF009B17849FF 9		524 DATA DE25207043A868AA6860 2	
88AAEA60C202A19857A 267B29F		1788810F7A918247E08 A552854		05D42A900A2D0A000085 4186428	
FD002C67BC67A	:REM*162	1A5538542A000	:REM*173	43D206543B002	:REM*199
503 DATA AD10154A4A4A857DAE11 1		514 DATA A200B14128083036701E F		525 DATA 3860207A18A001914188 8	
5E88AAEA70C202A1985 7C8574C		0033DF10C1DC90C9141 A541186		A9141C8207043C89141 853AE63	
67C20213F2907	:REM*19	90885419002E6	:REM*23	A90E6A55B2DA3	:REM*212
504 DATA 857518657A48A900657B 4		515 DATA 42E8E47690DEF0DCB01C 2		526 DATA 0CC89141AAA55D2907C8 9	
A686A4A4A8576A57A18 6548482		429100CBDC90C0A1DC9 0C31414		1418A18A00007141AA98 C871412	
9078588A57B65	:REM*12	C76413DC90C4C	:REM*28	076438545E645	:REM*103
505 DATA 49AA68C9408AE901B009 A		516 DATA 76415DC90C4C76416820 0		527 DATA A0059141C8A5299141A9 0	
57C18654AC9C8900160 AEA60CB		43FC674F007C682D0A1 4C9D406		718654185419002E642 209D3BA	
DC941857F2028	:REM*142	0FF7F3F1F0F07	:REM*178	9478534A9EF85	:REM*206
506 DATA 1985800A0A0A0A0A0A581 A		517 DATA 03010080C0E0F0F8FCFE F		528 DATA 35A92F8536A9F3853720 C	
900A47699F10C8810FA A675BDC		F000402000030C0F3033 3C3FC0C		F34A000A2000A1529141 20451AC	
0418DF10CA688	:REM*55	3CCCF0F3FCFF	:REM*87	8C44590F49818	:REM*229
507 DATA BDB941A47619F10C99F1 0		518 DATA 00050A0F50555A5FA0A5 A		529 DATA 654185419002E642E64A C	
CA900A4769178AEA70C 2028198		AAFF0F5FAFF000FF0FF 0055AAF		63AD0DD20EF18A53DD0 28209D3	

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531	DATA E01860A55F38E55BAAA5 6 0E55C60A56138E55D60 4A8A6A4 A242930014A60 :REM*129	542	DATA A015D010A202A010D00A A 200A000F004A201A008 A9FF5DD 0141869019DD0 :REM*170	552	DATA 60A25B209F3BA9082087 4 620591AA2008E190CC9 70F018C 978F023A2002C :REM*34
532	DATA 207A18AD04D0186D02D0 4 A4A4AAA20EF18E86020 EF184C9 64320703B207A :REM*120	543	DATA 141003A91B2CA9009950 1 E4C2B1B20CF34A000A6 5024293 005BD6435D003 :REM*215	553	DATA A2808E190CA01320C436 A 9102D870CF00FA918A2 1520914 6A217A0F7A90C :REM*168
533	DATA 18AD06D0C529D0EDAD11 0 C8523AD00D0AE01D0AC 02D020E F1820184B207A :REM*178	544	DATA BD6C353152AA24293006 8 AF002A901608AC90490 FA4A4A4 CF94420D84424 :REM*239	554	DATA D01EA910A210209146A2 0 BA0FAA912203446A24B A0FCA91 248AD170C205B :REM*38
534	DATA 18A55D8561AD02D02CD1 1 43002A9008D2E0CAE02 D0E8864 3207A18AD00D0 :REM*104	545	DATA 2930054901186901AAD0 0 4AD2C8060E003D005B1 4E290F6 0B14CE001D004 :REM*194	555	DATA 1A688641844285442033 3 3207A18462920CF3406 29AD170 C8543A000A200 :REM*120
535	DATA AC01D02CD0143003A900 0 8186D03D08D2C0C9001 C88C2D0 CAD04D0186D2E :REM*49	546	DATA 4A4A4A4A290F60CCA20C F 0039008060CDA10CF002 B0F8186 0C000F00160C9 :REM*153	556	DATA 2C190C3007A14191524C 6 046B1528141E641D002 E642981 86908A8CC180C :REM*173
536	DATA 0C4A4A4A200019854186 4 2AD2E0C200019853F86 40A907A 2D0204947A960 :REM*89	547	DATA C860A9302D870CF0334C F 645A9302D870CF0034C F345AEC 114D01EA2078E :REM*170	557	DATA 90E020043FC643D0D5AD 1 80C208746C644D0BF20 EF184CB F361865488548 :REM*255
537	DATA 8D9F0C203632E65DE661 A 55DC9C8B00EADD11418 6D2E0C8 D2E0CC643D0A0 :REM*79	548	DATA C114E88EC414206A18A9 0 F8547854620C21700D8 FF4E000 820EF18A9002C :REM*181	558	DATA 9002E649608D180C8E17 0 C60A00BA2FA20234720 7A18A20 0A0FF20E1469D :REM*255
538	DATA 4C9C43AE2C0CAD2D0C20 7 64348A8A53F8552A540 8553AD2 C0C2DA30C8550 :REM*8	549	DATA A9808D190CAEC114E88A 2 09146E010F008A208A9 20A023D 006A205A914A0 :REM*108	559	DATA 40099D42099D440920E1 4 69D41099D4309E8E8E8 E8E8E05 090E24CEF18A0 :REM*153
539	DATA ADD01448186D2C0C8D2C 0 C683002A9006D2D0C8D 2D0CA54 118692F854EA5 :REM*63	550	DATA 278E070C8D040C20C436 A 9FF8D050CA94E8D060C AE050CA C060CAD040C20 :REM*26	560	DATA 17A2F718202347207A18 A 0FF20E14699190DC03E 90F64CE F18C8B13F9141 :REM*17
540	DATA 4269F3854FA541186947 8			561	DATA 60A9100CA047AEAA0CE0 0 32098464C074720B518 08DA180

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100A918200A47	:REM*89	92C870C10034C	:REM*112	04E4B90E7A901	:REM*238
562 DATA 20463F4C2B1BA0108C8B 0		585 DATA 1E4B20C91220153BAD8E 0		608 DATA A20200813820153B20D8 4	
CAA50F38ED8B0CA8A5 10E9009		C200F47AE8E0C200819 855B865		4C900F0D62005452008 4C4C4D4	
0034C3219A900	:REM*75	C186D8B0C855B	:REM*105	CCD1E0CF0268D	:REM*224
563 DATA 6008843F864084418642 A		586 DATA 9002E65C186D8F0C855F A		609 DATA 20D08D200C0A0A0A0A8D 2	
23FC01708F002A22200 0819204		55C6900242910074A66 5F465C6		10C20C912A90E854685 47206C3	
947A9F4A20228	:REM*91	65B8560A44AA9	:REM*15	8AD210CAE1F0C	:REM*184
564 DATA F004A940A202289000A18 6		587 DATA 00AE8E0C203219AE8E0C 2		610 DATA 20CE38242930016020B6 4	
53F853F8A6540854060 A902A20		00819855D865E186D90 0C85618		CA54EA64F207038AD20 0CAE1E0	
0F00AA904A203	:REM*221	A690085624C46	:REM*200	C4CCB38AD1E0C	:REM*208
565 DATA D004A908A206484D9C0C 8		588 DATA 4B20BF188071C00D00A9 0		611 DATA 8D20D00A0A0A0A8D1F0C 6	
D9C0C682D9C0C208047 4C2B1BA		F8536A05820314AA060 20314AA		020653B20BF4C20FA3A 20D844C	
D971C491B8D97	:REM*253	050202E4AA068	:REM*100	900F0F3200545	:REM*42
566 DATA 1C4C2B1BF0048A4C8A47 8		589 DATA A91F2CA9008431AAA026 8		612 DATA 48207D3820CC34682080 4	
AA2002CA21BA88A998D 1C60A20		437A8208D19A9008548 8549A53		C4CD04CCA8A48AE080C BD2C1D2	
0A900F004A200	:REM*230	1854A4CEC19AD	:REM*101	08747688D080C	:REM*158
567 DATA A91B8D431D491B8D4C1D 8		590 DATA 1B0C8543A9708531A900 A		613 DATA AABD2C1D208A474C2B1B C	
ED8144C2B1BA9012CA9 022CA90		22520724AA531186908 8531C64		A8A48AE090CBD2F1D20 8747688	
42CA9088DD414	:REM*148	3D0EEA9102C87	:REM*140	D090CAABD2F1D	:REM*89
568 DATA A940052AA2001009A280 2		591 DATA 0CF00160A922A223AC1A 0		614 DATA 208A474C2B1B8A38E904 4	
CA200A52A29BF852A8E A00C4C2		C88D0C020B334900160 2C870C3		8AE0A0CBD321D208747 688D0A0	
B1B20D7474C2B	:REM*15	01020CF34A201	:REM*94	CAABD321D208A	:REM*127
569 DATA 1BCA8ED5148E20D08A0A 0		592 DATA 2C9F0C3003AE0B154C27 3		615 DATA 474C2B1B20373B20E839 A	
A0A0A8DD71460A21BAD 1D0C498		44CC2339985D99B95D 99BA5DC		E0B0CE88A48AE080C8E A60C202	
08D1D0C1002A2	:REM*100	8C86020913BA2	:REM*18	A19242910014A	:REM*88
570 DATA 008EC71C4C2B1BA9408D 8		593 DATA 5BA05F20A13BADA30C49 F		616 DATA 8D920CA9008D930CCE92 0	
70C208D18AEC114D002 A207E88		F255B855B0DA30C855F 6028004		C68AE090C8EA70C202A 198D940	
AA8A900E010F0	:REM*82	7013800370120	:REM*32	CCE940C20253A	:REM*35
571 DATA 2BA920D024A9108D870C 2		594 DATA 153B20333320BF36A54C 8		617 DATA B0FB20CF12900D20394B 2	
08D1820B51800D8E803 00A218A		950B003A90060E970B0 01602C8		0153BA01B20383330E9 20CC17F	
015100CA9208D	:REM*224	70C3010CD8A0C	:REM*76	7145B00040020	:REM*106
572 DATA 870C208D18A210A010A9 1		595 DATA B0F1A649D0EDA648EC89 0		618 DATA 5B4B9008200E4E204B4E F	
08D8B0C8A4A8D1A0C8A 8E8E0CC		CB0E64A4A186DF51485 4AACF41		0D3205B4B20094E2001 14C900F	
A8E8F0C0A0A2	:REM*173	4A248205A262A	:REM*200	0C62013279006	:REM*220
573 DATA 2910014A8D890C984A69 0		596 DATA 186DF31485489001C884 4		619 DATA 20164E4C734D204317AE 0	
08D1B0C980A0A8D8A0C 888C900		920784A20A24A20A84B 38A9016		B0CF013E007D004186D 0F0C20D	
CA980852AAD0B	:REM*225	08E930C4C334B	:REM*155	64D209F4E9003	:REM*255
574 DATA 15208D4920BF18005CE8 0		597 DATA A9808523A94FA200A015 8		620 DATA 204B4E4C734D8E10158E 0	
30EA90E8D21D020114A 204B4A2		E930C2429100844E930C 6A8D920		115A8AD0D0CAE0E0C20 AC17206	
04E45A9028543	:REM*27	C8C940C20253A	:REM*171	A18A000B15499	:REM*122
575 DATA A000A200BD0C1520964A C		598 DATA B0FB200F3B204E4B90F3 2		621 DATA 190DC8CC0C0C90F520EF 1	
8E8E44390F44C4E4920 703BA98		09D3BA0174C3833205B 4B90021		8AE0A0C2028190A0A0A A219A00	
08D870CA5208D	:REM*73	860205B44CCF	:REM*233	D4CEE3FA01B4C	:REM*152
576 DATA 880C201E4BA55D4A4A4A C		599 DATA 12209D3BA548186D920C 8		622 DATA C436200114C900D0F960 C	
9129007E90FA8A90FB0 0C38E90		55FA5496D930C8560A8 A55F202		90DF031C914F043C912 D006A98	
4A004B0056904	:REM*206	B45B032A54A48	:REM*25	08D0F0C60C992	:REM*127
577 DATA A8A9001865208520980A 0		600 DATA 186D940C900368B026C9 C		623 DATA D004A900F0F4C99DF04C C	
A0A855D186915856120 0B24A91		8B0F94820183C684885 4A20183		91DF067C991D0034CBF 4EC911D	
08D8B0C20114A	:REM*222	C209D3B688561	:REM*132	0034CD24EC913	:REM*123
578 DATA A900A02820964A186911 9		601 DATA A900856220983C209A3B 6		624 DATA F00D6020D24EA9008DF7 1	
0F820464BA0AA20CB13 A900852		8854A20983C1860A948 A27FA08		48DF81460A9008DF914 8DFA14F	
320A84B20253A	:REM*247	020A342A55B38	:REM*86	0EF20804EB001	:REM*142
579 DATA B0FBA9808D9F0C20C34A 2		602 DATA EDF3140A0A8548A90085 4		625 DATA 6020094EAD0A0C48A900 8	
0C94A20CF1290EB202F 17A9008		B2A8549A55D38EDF514 0A0A186		D0A0CAE0B0CA92020D6 4D688D0	
D9F0C20C34AF0	:REM*94	970854A20CB3F	:REM*98	A0C60EE920CAD	:REM*146
580 DATA 2D9006241330D810EBA5 4		603 DATA 2C870C10256A01720C436 2		626 DATA F71438ED920CCE920C48 A	
AC968B0E52C870C300B A21820A		0CF34A054A24C20A13B A00F20C		DF814E900B00268608D F814688	
949208D494CF	:REM*18	43620CF34A90B	:REM*185	DF71460EE920C	:REM*120
581 DATA 48A21020A949290FAAE8 2		604 DATA 8D910CA200A9048544A0 0		627 DATA ADF714ACF814186D920C C	
0D7474CFF482C870C30 2A5012A		0A9048543B154814CB1 56814E2		E920C9001C8202B4590 01608CF	
D8B0CF02320CC	:REM*23	02E4CC643D0F1	:REM*105	8148DF71460EE	:REM*58
582 DATA 17BF4A19000400A071D0 1		605 DATA C8C00A90E8CE910CF015 C		628 DATA 940CADF91438ED940CCE 9	
820CC17BB4A19000400 A9102D8		644D0DDA55418692885 5485569		40C90038DF91460EE94 0CADF91	
70CF003A0462C	:REM*210	0CEE655E657D0	:REM*75	4186D940CCE94	:REM*139
583 DATA A0512CA06C841E20CB13 2		606 DATA C860A24CF600D002F601 F		629 DATA 0CC9C8B0038DF914604C	
0B04920BD134CF348A2 0E2901F		602D002F603A2006020 653BADA			:REM*214
00FA200242910	:REM*27	30C8D920CA907	:REM*221		:REM*229
584 DATA 09A010CC870CD002A903 8		607 DATA 8D940C20BF4C20253AB0 F			
E20D08D0B1560A40FA5 104C321		B20153B20A24AA55D29 F8855D2			

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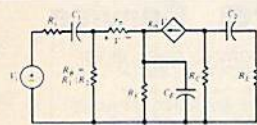
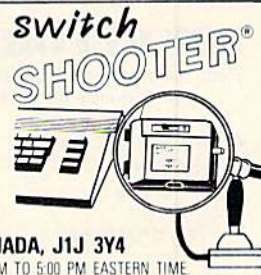
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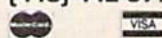
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RUN'S CHECKSUM

TYPE IN *RUN*'S CHECKSUM, which serves for both the C-64 and for the C-128 in either 40- or 80-Column mode, and save it to disk before running. When typing in a program from *RUN*, first load and run *RUN*'s Checksum. The screen will display a SYS number that deactivates and reactivates the Checksum. Always disable *RUN*'s Checksum before attempting to run another program. Note: You can abbreviate Basic keywords; spaces affect the checksum only when within quotes; and the order of characters affects the checksum.

With this new version, when you press return after typing in a program line, a one-, two-, or three-digit number from 0 to 255 appears in the home position. If this number matches the checksum value in the program listing, the line is correct. If the number that appears *doesn't* match the checksum value, compare the line with the magazine listing to find your error. Then move the cursor back up to the line and make your corrections. Now, after you press return, the correct checksum value should appear. Continue entering the listing until all the lines have been correctly typed. Then deactivate *RUN*'s Checksum, using the SYS number. Save the finished program.

All the graphics and control characters in the listings in *RUN* have been translated into understandable key combinations. They are the instructions you see inside the curly braces. For example, {SHIFT L} means you hold down the shift key while you press the L key. You do *not* type in the curly braces. What appears on the screen will look quite different from what is designated inside the braces. Here are some more examples:

- {22 SPACES}—press the space bar 22 times
- {SHIFT CLR}—hold down the shift key and press the clr-home key
- {2 CRSR DNs}—press the cursor-down key twice
- {CTRL 1}—hold down the control key and press the 1 key
- {COMD T}—hold down the Commodore logo key and press the T key
- {FUNCT 1}—press the F1 key
- {5 LB.s}—press the British pound key (*not* #) five times 

Listing 1. *RUN*'s Checksum program. This program is available on *RUN*'s BBS for users to download.

```

10 REM RUN'S CHECKSUM 64/128 - BOB KODADEK
20 MO=128:SA=3328:IF PEEK(40960)THEN MO=64:SA=4
  9152
30 FOR I=0TO169:READB:CK=CK+B:POKE SA+I,B:NEXT
40 IFCK<>20651 THENPRINT"DATA ERROR!":END
50 POKESA+110,240:POKESA+111,38:POKESA+140,234
60 PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
70 PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128
  THEN 100
80 POKESA+13,124:POKESA+15,165:POKESA+25,124:PO
  KESA+26,165
90 POKESA+39,20:POKESA+41,21:POKESA+123,205:POK
  ESA+124,189
100 POKESA+4,INT(SA/256):SYS SA:NEW
110 DATA 120,162,24,160,13,173,4,3,201,24,208,4
  ,162,13,160,67,142,4,3,140
120 DATA 5,3,88,96,32,13,67,152,72,169,0,141,0,
  255,133,176,133,180,166,22
130 DATA 164,23,134,167,132,168,170,189,0,2,240
  ,58,201,48,144,7,201,58,176
140 DATA 3,232,208,240,189,0,2,240,42,201,32,20
  8,4,164,180,240,31,201,34
150 DATA 208,6,165,180,73,1,133,180,230,176,164
  ,176,165,167,24,125,0,2,133
160 DATA 167,165,168,105,0,133,168,136,208,239,
  232,208,209,169,42,32,210
170 DATA 255,165,167,69,168,170,169,0,32,50,142
  ,169,32,32,210,255,32,210
180 DATA 255,169,13,32,210,255,104,168,96,104,1
  70,24,32,240,255,104,168
190 DATA 96,56,32,240,255,138,72,152,72,24,162,
  0,160,0,32,240,255,169
200 DATA 42,208,198
  
```

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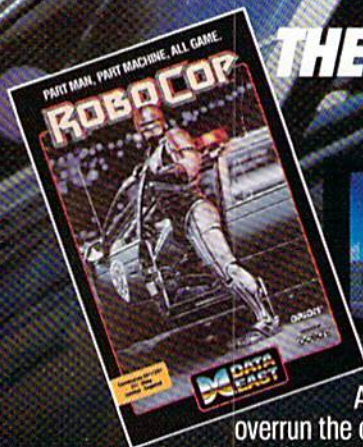
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